

NASA

1980 MISHAP

AND INJURY DATA

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## NASA PERSONNEL INJURIES FOR 1980

NASA had a 3% decrease in lost time injuries/illnesses in 1980. Three charts compare injury rates (pp.2, 3, and 4): LOST TIME CASES IN FEDERAL AGENCIES - 1980, LOST-TIME INJURY RATES--PRIVATE SECTOR--FEDERAL AGENCIES--NASA--SELECTED INDUSTRY, and INJURY RATES: PRIVATE--FEDERAL GOV'T--NASA--SELECTED INDUSTRY, and on page 4, a chart compares NASA rates since 1972. This year the LOST TIME CASES IN FEDERAL AGENCIES - 1980 shows a small decrease for several agencies and for All Government; however, there were several agencies showing increases. The rates shown on the charts for INDUSTRY were obtained from the Bureau of Labor Statistics and are one year late for our reports. The charts will be updated when the data becomes available and they will be provided to you under separate cover. Although the NASA lost time injury rate increased steadily from 1969 until 1978, the total injury rate has decreased dramatically since 1973 (see p. 5).

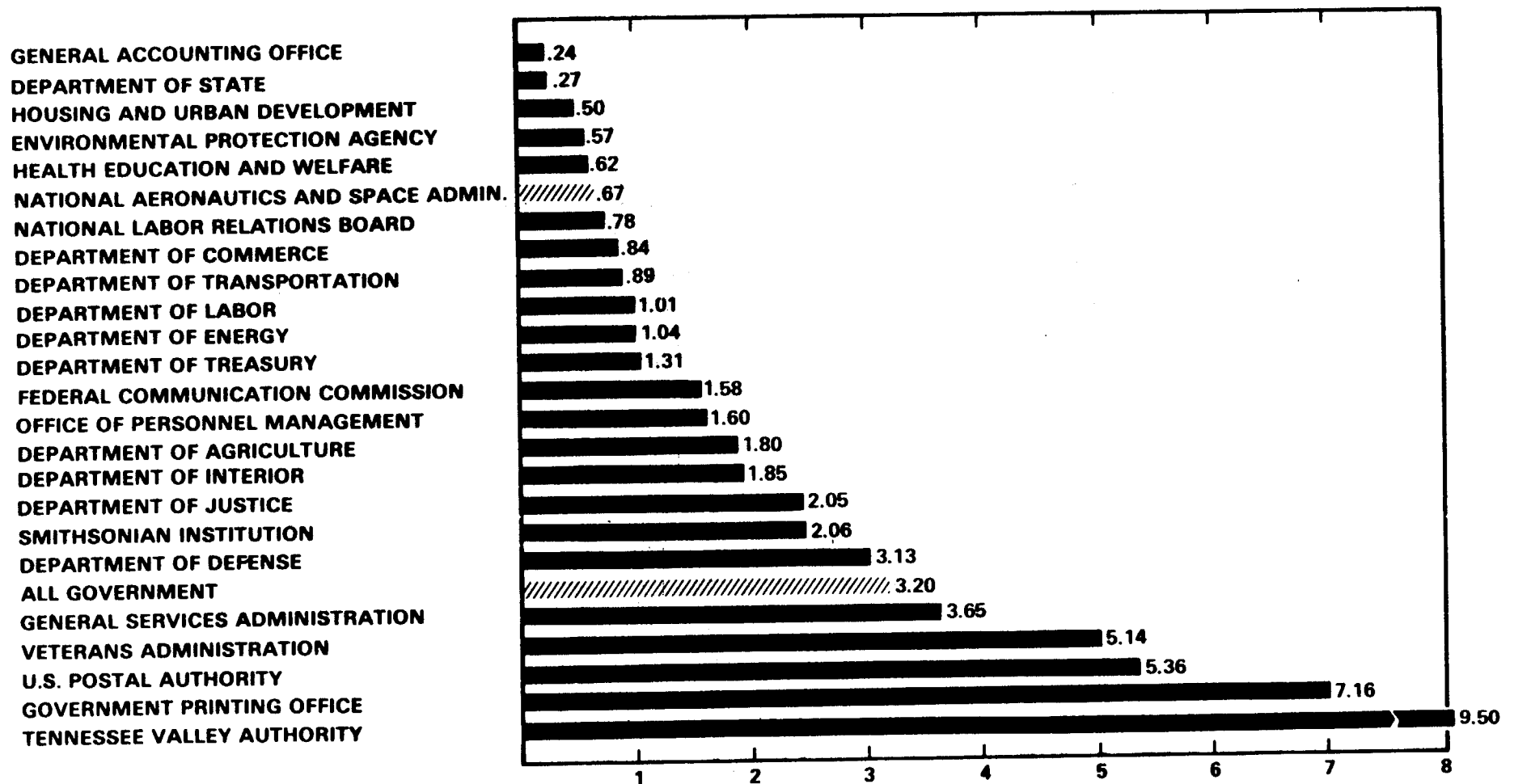
The NASA lost time injury/illness frequency rate went down from 0.82 in 1977 to 0.81 in 1978, 0.69 in 1979, and 0.67 in 1980. In 1980, there were six NASA installations which had less injuries/illnesses than the agency rate of 0.67, MSFC had a rate of 0.09, and NSTL and MAF had "0" rates. The following installations reduced their lost time rates during 1980: DFRC, GSFC, LaRC, LeRC, and MSFC. MSFC made the largest percentage decrease in lost time frequency rate by reducing their rate from 0.42 to 0.09 (79%), LaRC followed with a 27 percent decrease, DFRC was next with a 16 percent decrease, and GSFC had a 14 percent decrease.

All centers except MAF submitted Form 345's (Accident Cause Analysis Reports, pp. 18 and 19) for Federal Employees, and MAF had no injuries. The lost time cases indicated here differ by 18 percent from those reported on the Form 102F's (Federal Occupational Injuries and Illness Survey), and the total cases are approximately 17 percent more than those listed on the 102F's. This may indicate that some centers include first aid cases while others do not. Seven centers also included 345's for contractors, pp. 20 and 21. Again there are some numbers that seem to be inconsistent; however, these apparent disagreements may be the result of how reportable cases and first aid cases are recorded.

As in years past, the message from all of this is that while slips, trips, and falls will always be with us, top managers can and should exercise more direct supervision of day-by-day working conditions, fully investigate each injury, and take action to prevent recurrences and potential abuse of Continuation of Pay and Federal Employee Compensation procedures. In addition, the chart on page 22 is a control chart that will indicate where the agency lost time rate has been during the year. Every effort should be made to drive the lost time rate toward the lower limits with the intent of returning to a rate of approximately 0.2 to 0.3 over the next several years.

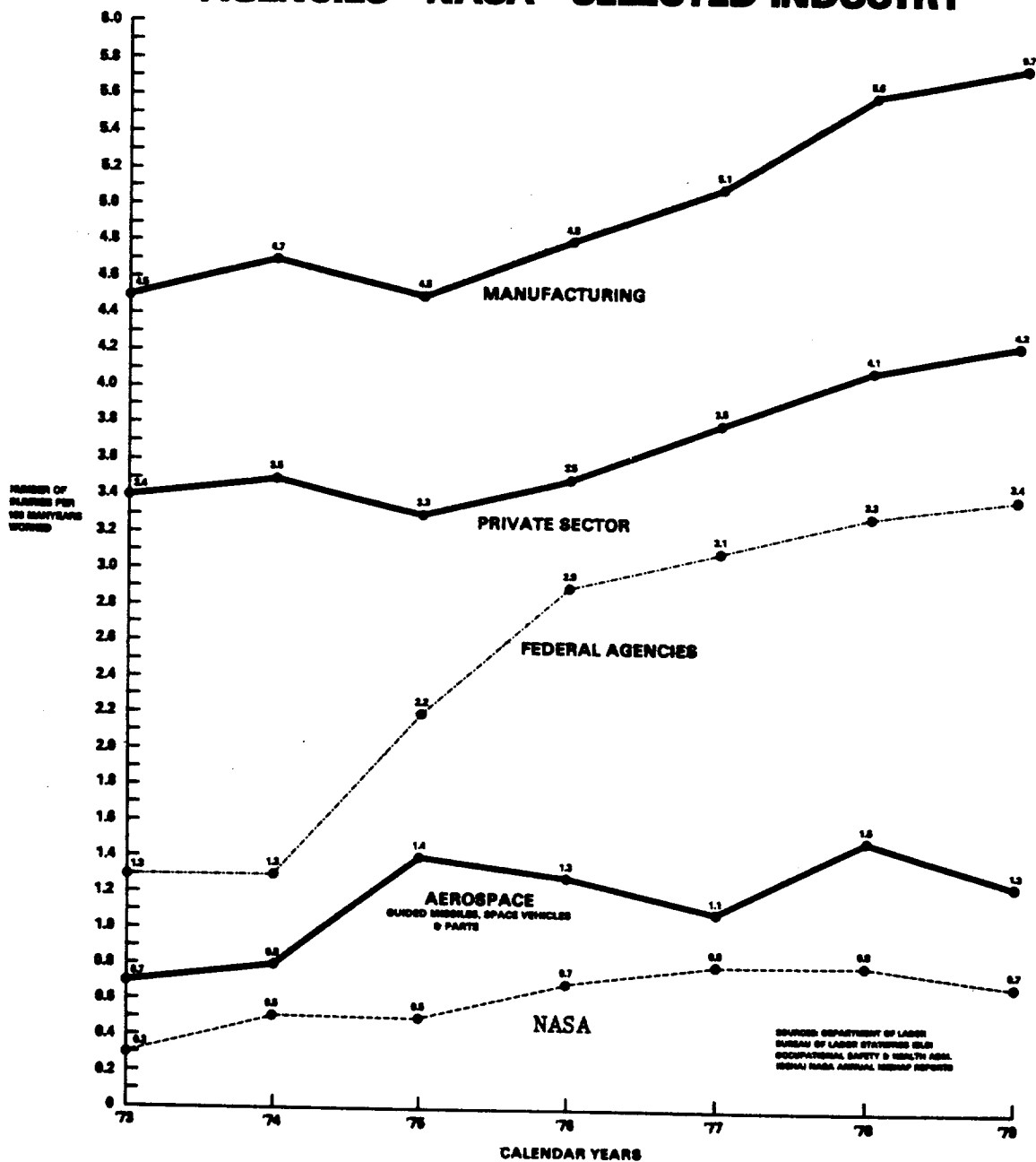
# **LOST TIME CASES IN FEDERAL AGENCIES — 1980** **OCCUPATIONAL INJURY RATES FOR CIVILIAN PERSONNEL** **PER 200,000 MAN-HOURS**

2  
 FIGURE 1



SOURCE: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, U.S. DEPARTMENT OF LABOR

# **LOST-TIME INJURY RATES: PRIVATE SECTOR—FEDERAL AGENCIES—NASA—SELECTED INDUSTRY**

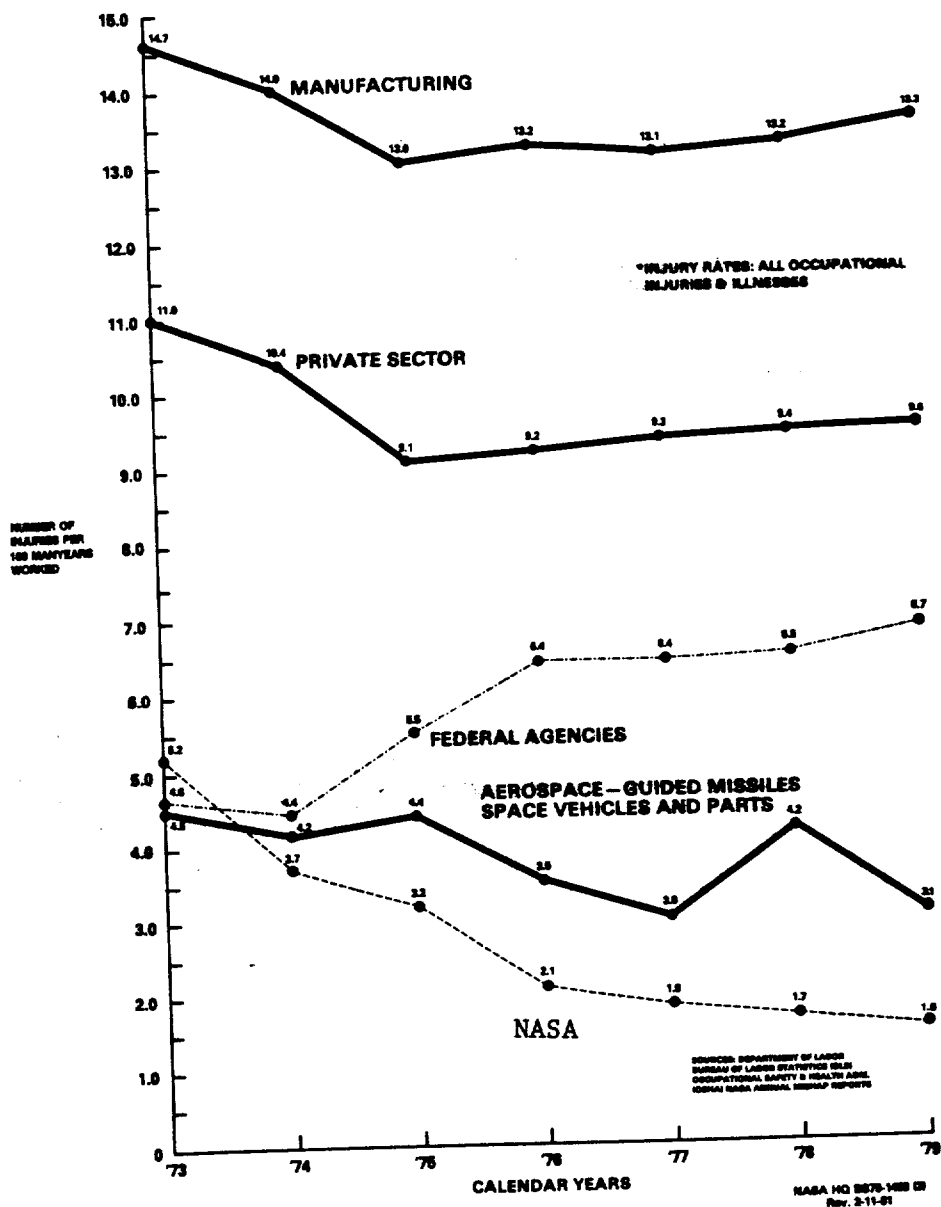


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Space  
Administration

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Rev. 2-11-61

FIGURE 2

# INJURY RATES\* PRIVATE SECTOR—FEDERAL AGENCIES—NASA—SELECTED INDUSTRY

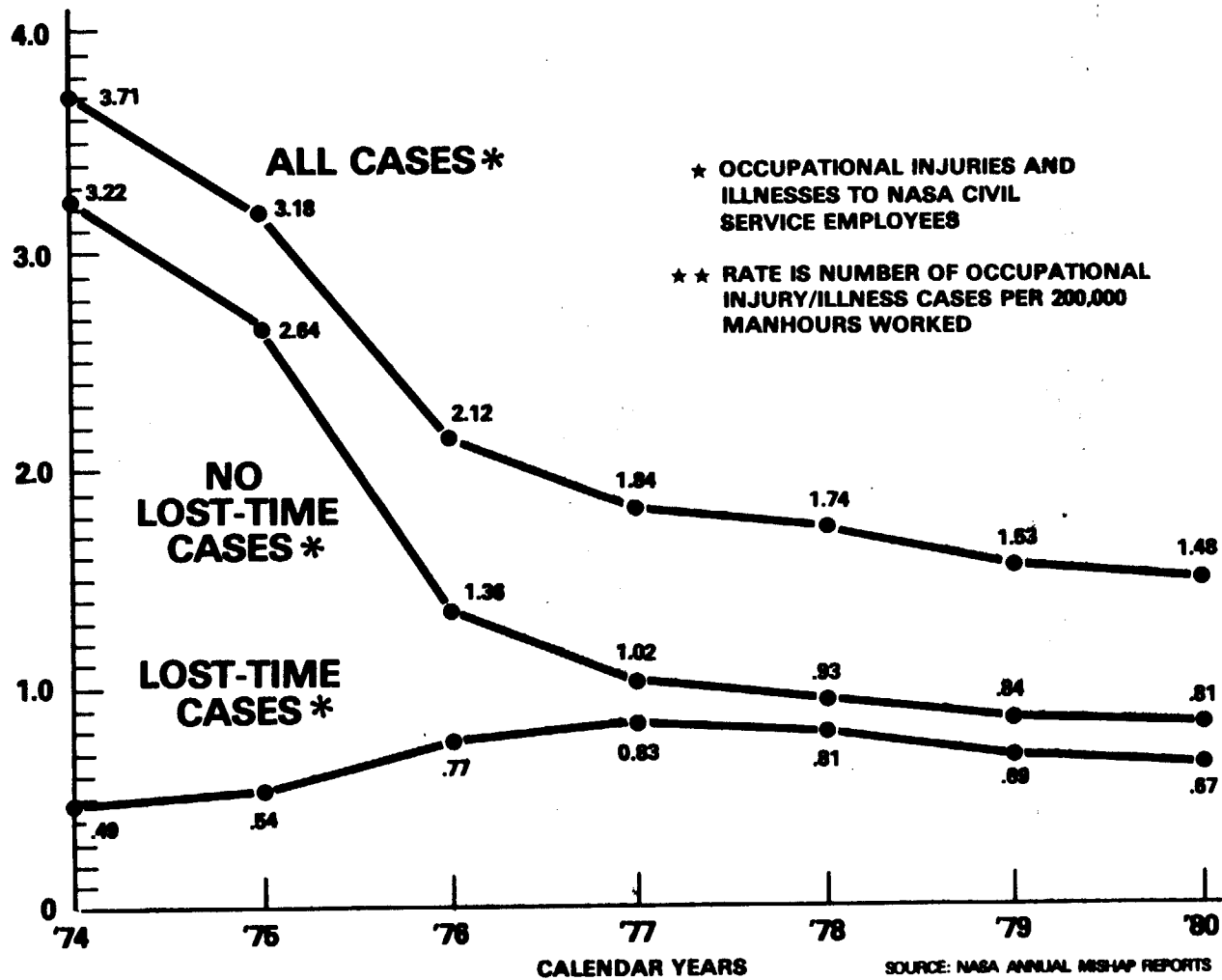


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FIGURE 3

# NASA OCCUPATIONAL INJURY/ILLNESS\*\* RATES\*\* (1974-1980)

NUMBER OF  
INJURIES/ILLNESSES  
PER 200,000 MANHOURS  
WORKED



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Space Administration

NASA HQ D878-1487 (3)  
REV. 2-17-81

FIGURE 4

# OCCUPATIONAL INJURY/ILLNESS SEVERITY RATE NASA-FEDERAL AGENCIES-INDUSTRY

DAYS LOST PER  
200,000 HOURS  
WORKED

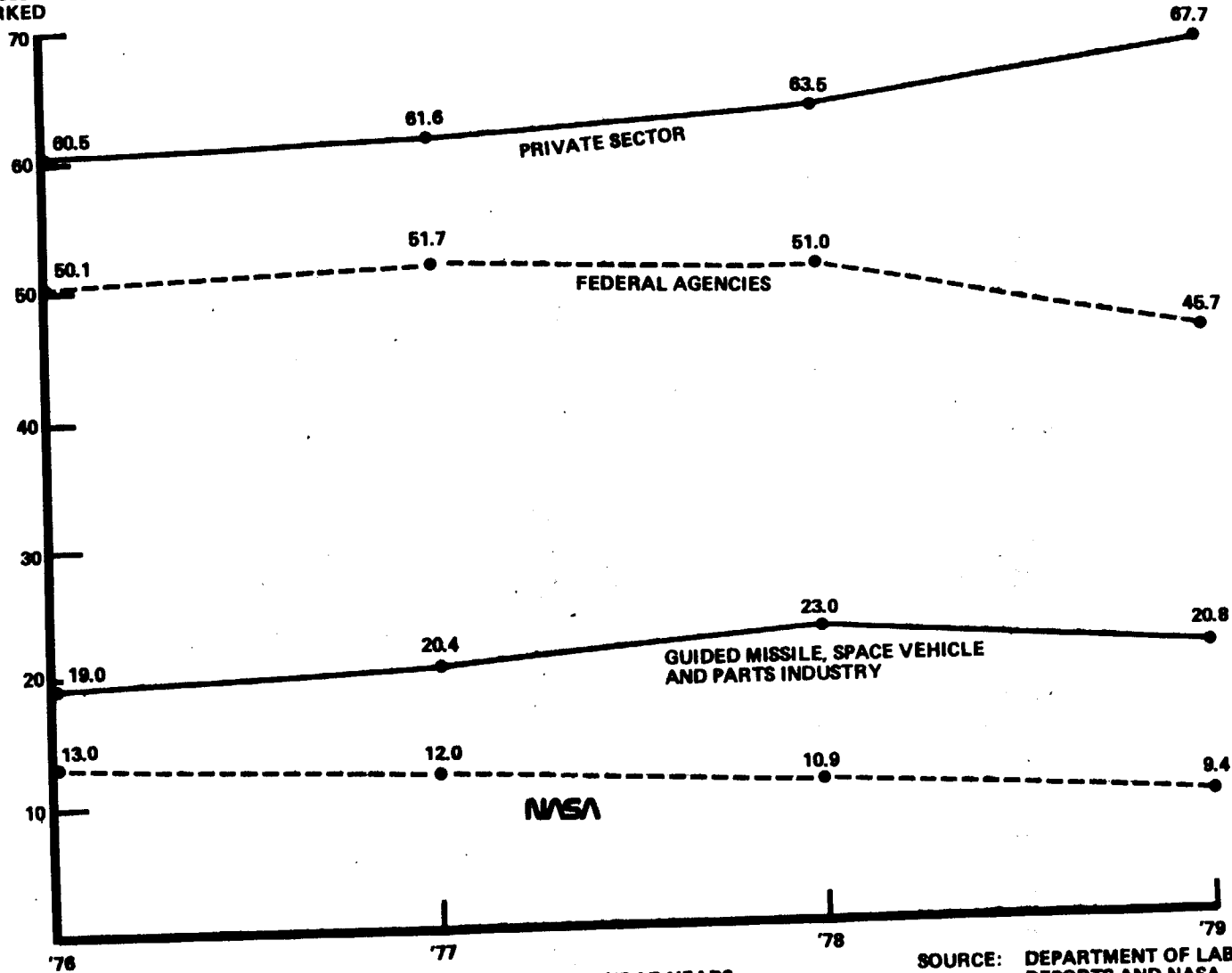


FIGURE 5



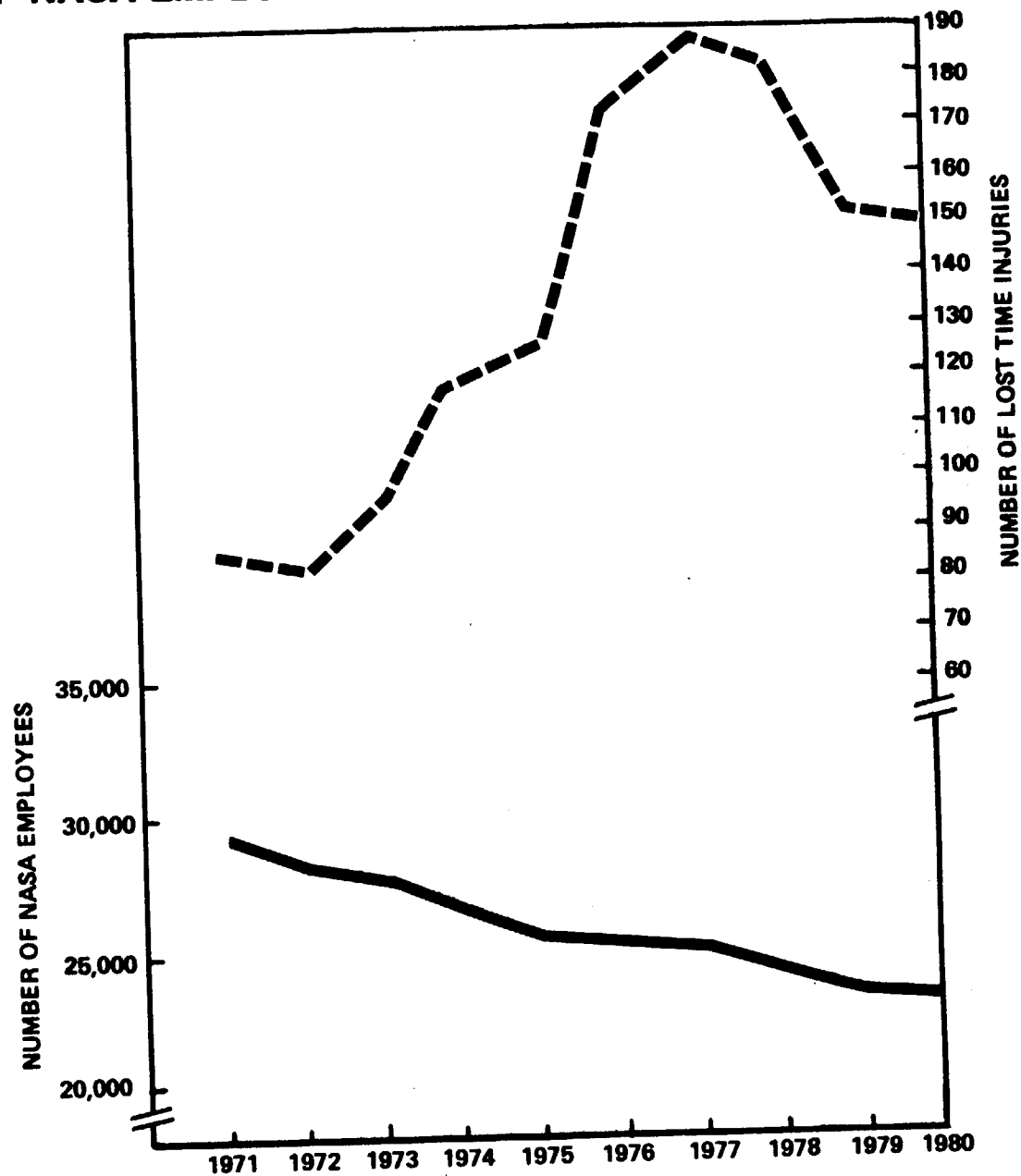
**NASA INJURY AND ILLNESS DATA BY INSTALLATION - - ANNUAL 1980**

	NO. OF EMPLOYEES	HRS WORKED IN (K)	TOTAL INJURY/ ILLNESS DATA			LOST TIME INJURY/ILLNESS DATA				
			NO. CASES	FREQ. 1979	RATE 1980	NO. CASES	NO. DAYS	FREQ. 1979	RATE 1980	SEVERITY RATE
ARC	1,748	3,459	35	2.37	2.02	26	175	1.40	1.50	10.12
DFRC	462	903	6	1.76	1.33	5	55	1.32	1.11	12.18
GSFC	3,446	6,590	40	1.06	1.21	25	269	.88	.76	8.16
HQ	1,655	3,002	42	1.39	2.80	9	43	.49	.60	2.86
JSC	3,772	7,355	13	.16	.35	11	88	.16	.30	2.39
KSC	2,293	4,550	18	.46	.79	16	304	.32	.70	13.36
LaRC	3,031	5,534	41	2.66	1.48	20	233	.99	.72	8.42
LeRC	2,957	5,365	104	3.97	3.88	32	236	1.21	1.19	8.80
MAF	24	42	0	4.08	0	0	0	0	0	0
MSFC	3,615	6,649	16	.66	.48	3	253	.42	.09	7.61
NSTL	111	232	0	0	0	0	0	0	0	0
WFC	425	802	14	5.39	3.49	2	21	.27	.50	5.23
<b>TOTAL</b>	<b>23,539</b>	<b>44,483</b>	<b>329</b>	<b>1.53</b>	<b>1.48</b>	<b>149</b>	<b>1,677</b>	<b>.69</b>	<b>.67</b>	<b>7.54</b>
<b>LAST YEAR</b>	<b>23,737</b>	<b>44,222</b>	<b>339</b>	<b>1.53</b>	<b>---</b>	<b>153</b>	<b>2,081</b>	<b>.69</b>	<b>---</b>	<b>9.41</b>

1. TOTAL INJURY/ILLNESS FREQUENCY RATE - NO. OF CASES PER 200,000 HOURS WORKED.
2. INJURY FREQUENCY RATE - NO. OF LOST WORKDAY CASES PER 200,000 HOURS WORKED.
3. INJURY SEVERITY RATE - NO. OF LOST WORKDAYS PER 200,000 HOURS WORKED.

FIGURE 6

# NUMBER OF NASA EMPLOYEES AND NUMBER OF LOST TIME INJURIES VS TIME

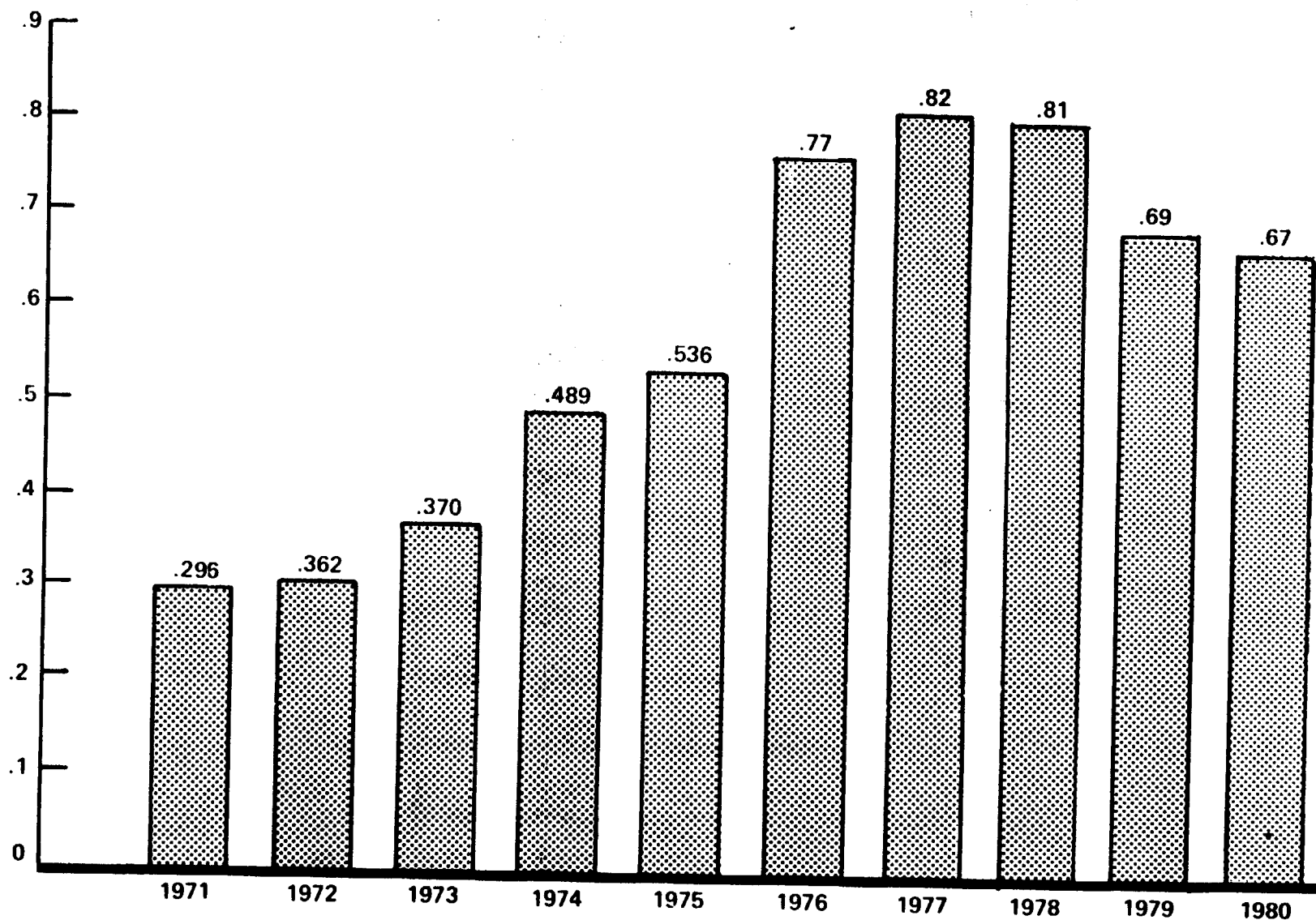


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3-18-80

FIGURE 7

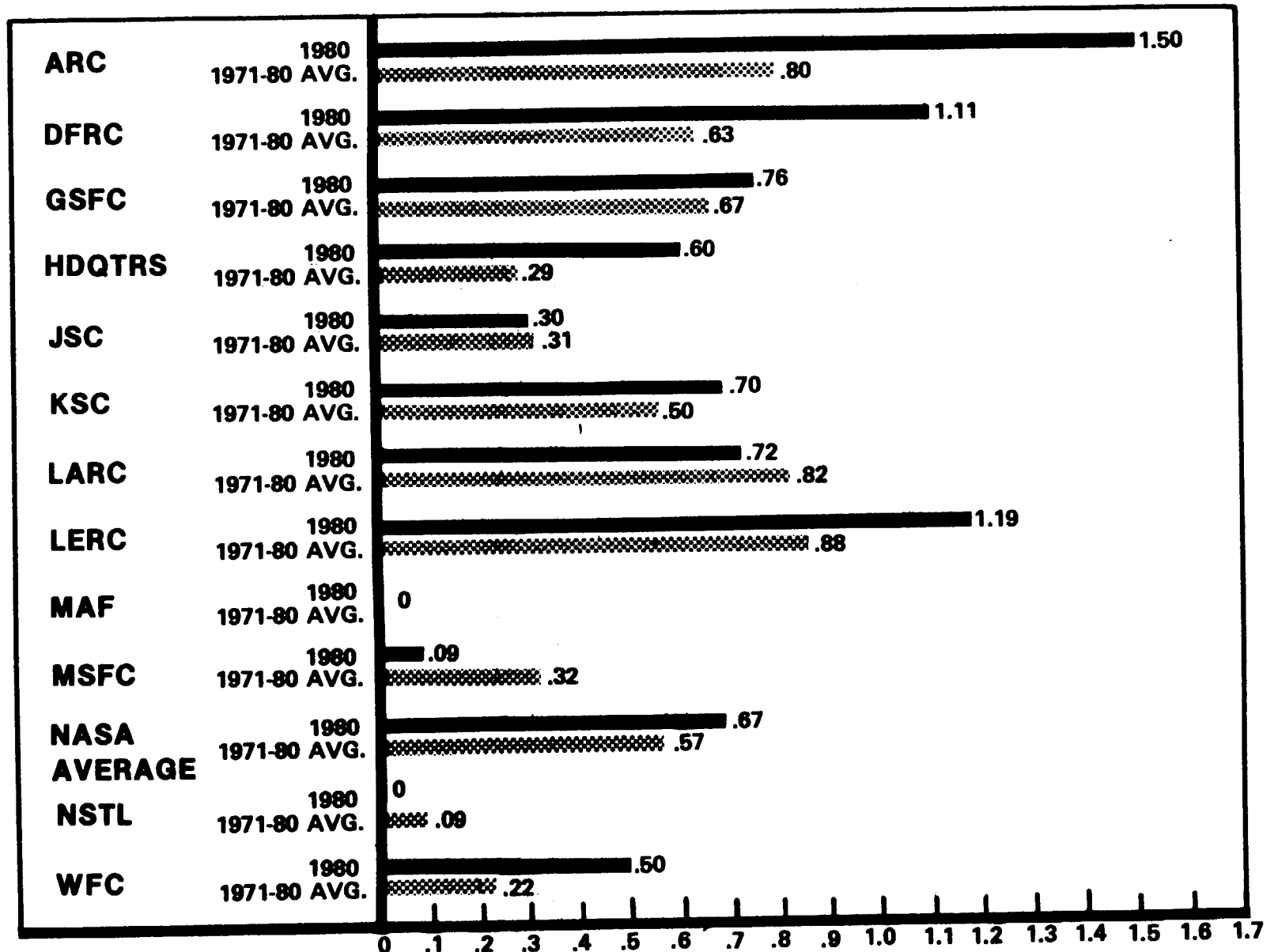
# NASA INJURY FREQUENCY RATE

FREQUENCY RATE



FREQUENCY RATE IS THE NUMBER OF LOST TIME INJURIES PER 200,000 HOURS WORKED

# NASA INJURY FREQUENCY RATES (LOST TIME)



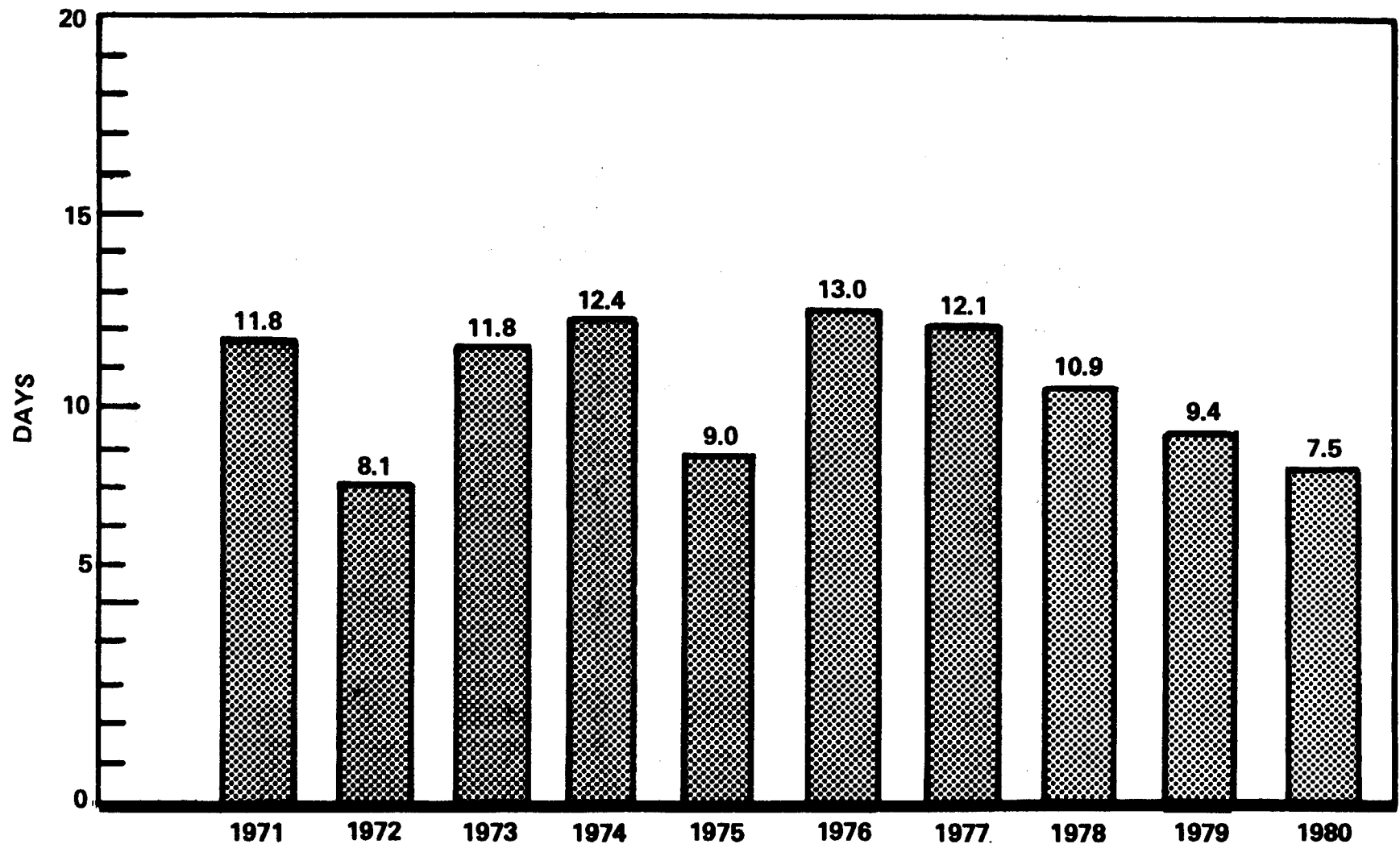
FREQUENCY RATE IS THE NUMBER OF LOST TIME  
INJURIES PER 200,000 HOURS WORKED

FREQUENCY RATE

NASA HQ N180-1857 (1)  
REV. 2-27-81

FIGURE 9

# NASA INJURY SEVERITY RATE



SEVERITY RATE IS THE NUMBER OF DAYS LOST PER 200,000 HOURS WORKED.

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REV. 2-27-81

**NASA MISHAP DATA BY INSTALLATION --- ANNUAL 1980**

	AUTO MISHAP FREQ. RATE		AIRCRAFT MISHAPS		FIRE LOSSES		OTHER MISHAPS		TOTAL	MISHAPS
	GOV	POV	NO.	RATE	NO.	(\$K)	NO.	(\$K)	COST (\$K)	RATE (\$K)
ARC	0	2.68	1	31.53	8	2.15	4	16.71	24.48	7.08
DFRC	0	0	0	0	0	0	0	0	0	0
GSFC	3.39	1.55	0	0	4	38.77	1	200	249.83	37.91
HQ	0	3.09	0	0	0	0	0	0	.61	.20
JSC	0	0	0	0	7	8.20	0	0	8.20	1.11
KSC	3.14	2.55	0	0	0	0	3	1.00	2.78	.61
LaRC	3.60	0	1	123.61	2	2.75	0	0	6.21	1.12
LeRC	4.29	1.92	0	0	0	0	0	0	.80	.15
MAF	0	0	0	0	0	0	0	0	0	0
MSFC	1.68	4.17	1	46.64	0	0	1	5,900	5,903.84	887.94
NSTL	0	0	0	0	0	0	0	0	0	0
WFC	3.68	0	0	0	0	0	0	0	.46	.58
<b>TOTAL</b>	<b>2.69</b>	<b>1.68</b>	<b>3</b>	<b>11.91</b>	<b>21</b>	<b>51.87</b>	<b>9</b>	<b>6,117.71</b>	<b>6,197.21</b>	<b>139.32</b>
<b>LAST YEAR</b>	<b>5.26</b>	<b>.88</b>	<b>2</b>	<b>7.70</b>	<b>28</b>	<b>36.75</b>	<b>19</b>	<b>209.70</b>	<b>324.75</b>	<b>7.34</b>

1. AIRCRAFT MISHAP FREQ. RATE = NO. OF MISHAPS PER 100,000 HOURS FLOWN.
2. MOTOR VEHICLE MISHAP FREQ. RATE = NO. OF MISHAPS PER MILLION MILES DRIVEN.
3. TOTAL COST OF MISHAPS INCLUDES REPAIRS/REPLACEMENTS OF MOTOR VEHICLES AND DAMAGE, AND TORT CLAIMS (AS ON OSHA FORM 102FF).
4. MISHAP COST RATE= TOTAL COST OF MISHAPS PER MILLION HOURS WORKED.

# COST OF CY 1980 NASA ACCIDENTS/INCIDENTS/INJURIES

## MANPOWER LOSS

0  
180  
149  
1677

FATALITIES  
NON-LOST WORKDAY INJURIES  
LOST WORKDAY INJURIES  
WORK DAYS LOST = 6.45 YEARS EFFORT

## MONEY LOSS

WAGES (COP RELATED COSTS) \$ 128,235

CHARGE BACK BILLING  
TO FEDERAL EMPLOYEES  
COMPENSATION FUND  
(1980) \$3,898,301  
SUB-TOTAL \$4,026,535

## MATERIAL LOSS

AIRCRAFT 6,663  
VEHICLES 8,845  
FIRE 51,872  
OTHER PROPERTY \$6,117,710  
SUB-TOTAL \$6,185,090

## NO. OF MISHAPS

3  
31  
21  
9  
64

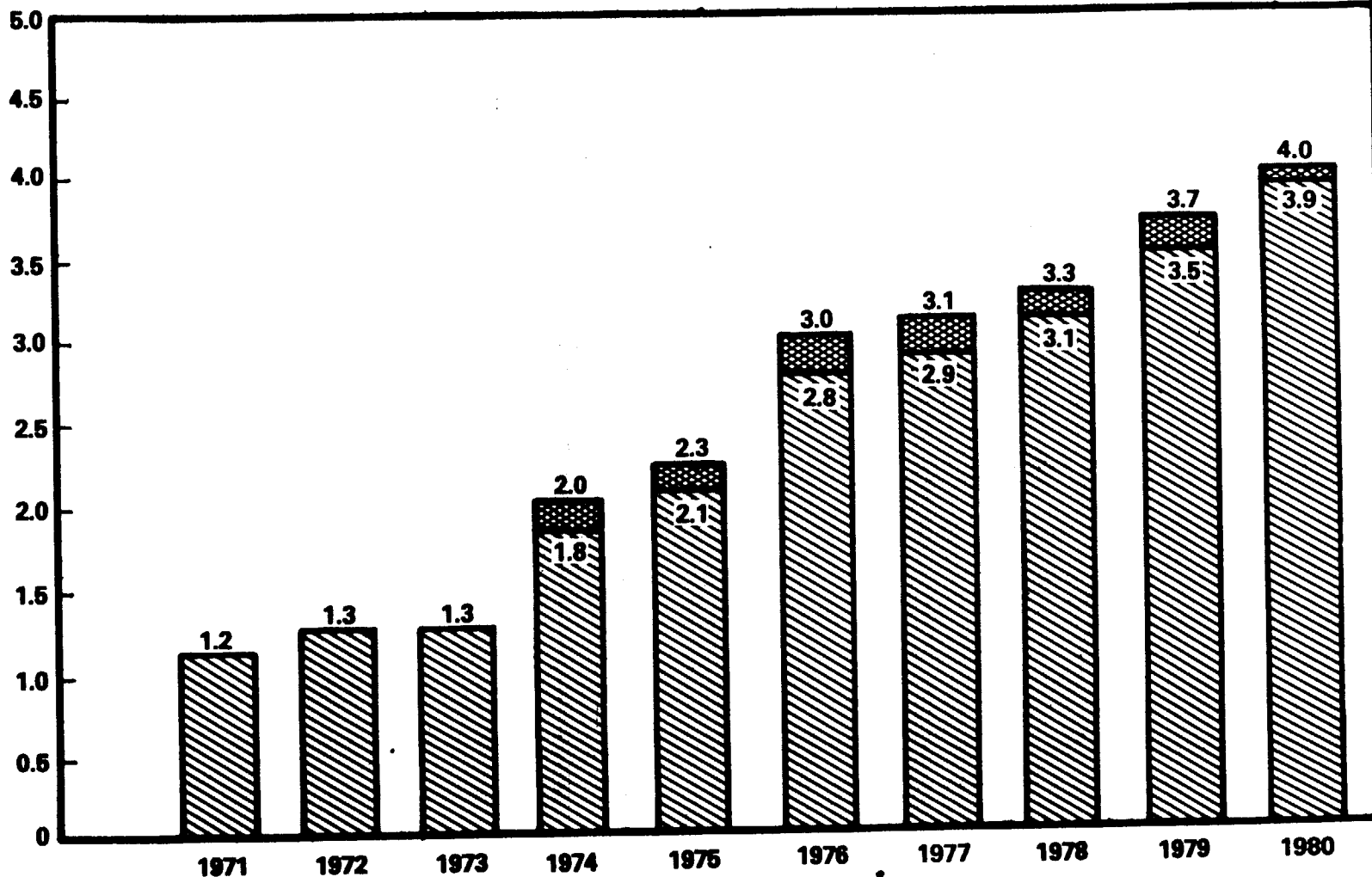
## TOTAL LOSS

\$10,211,625

DOES NOT INCLUDE CONTRACTOR DATA  
DOES NOT INCLUDE FUTURE COSTS FOR THE INJURIES AND ILLNESS;  
SINCE THEY WILL BE PART OF THE ANNUAL CHARGEBACK BILLING  
DOES NOT INCLUDE MISSION FAILURES  
DOES NOT INCLUDE TEST OPERATIONS FAILURES

MILLIONS  
OF  
DOLLARS

# NASA MONEY LOSSES DUE TO MISHAPS\*



\*INCLUDES LOST WAGES AND CHARGE BACK BILLING TO THE FEDERAL EMPLOYEES  
COMPENSATION FUND, BUT DOES NOT INCLUDE CONTRACTOR LOSSES.



LOST WAGES



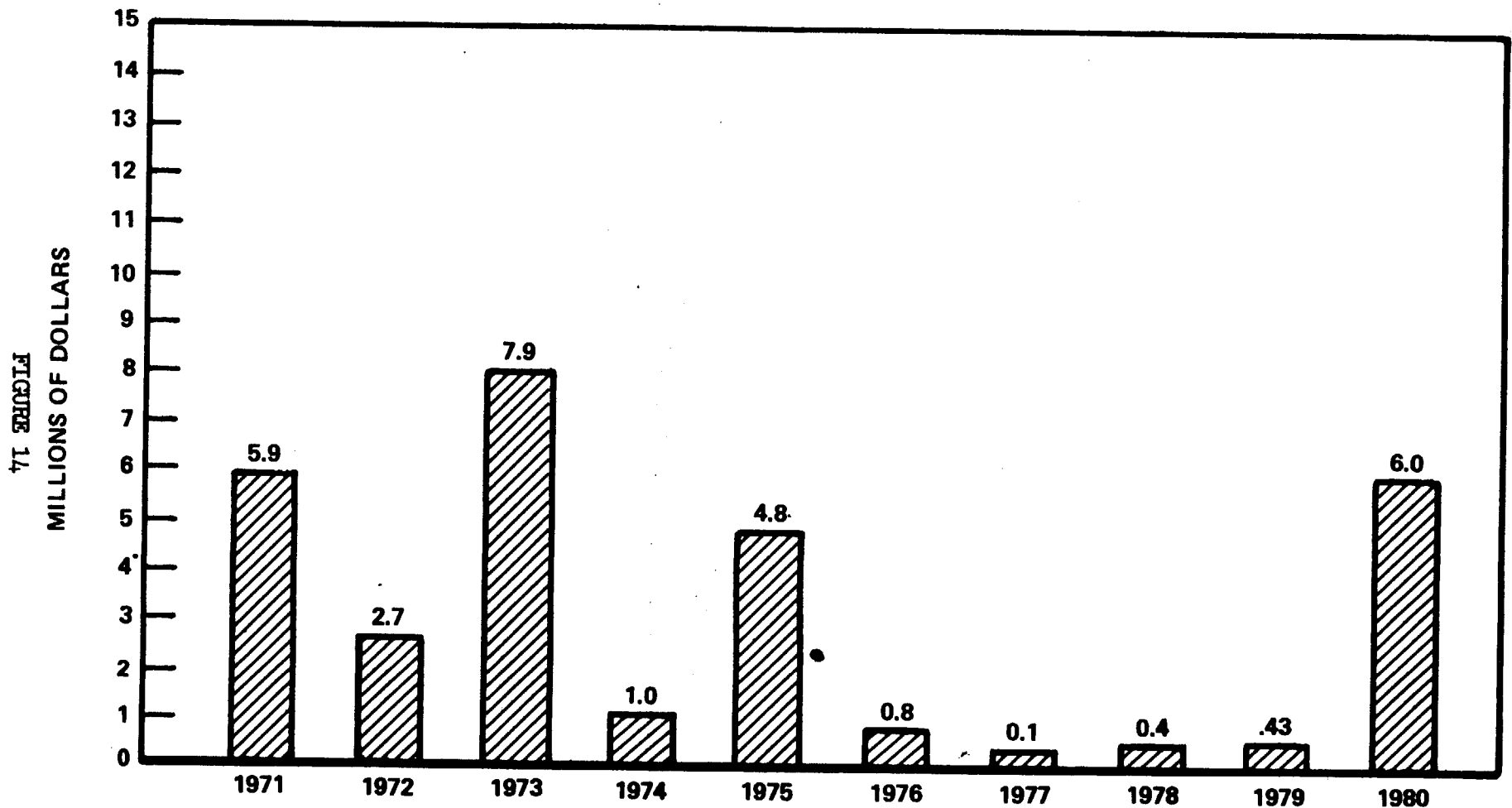
CHARGE BACK  
BILLING

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REV. 2-27-81

FIGURE 13

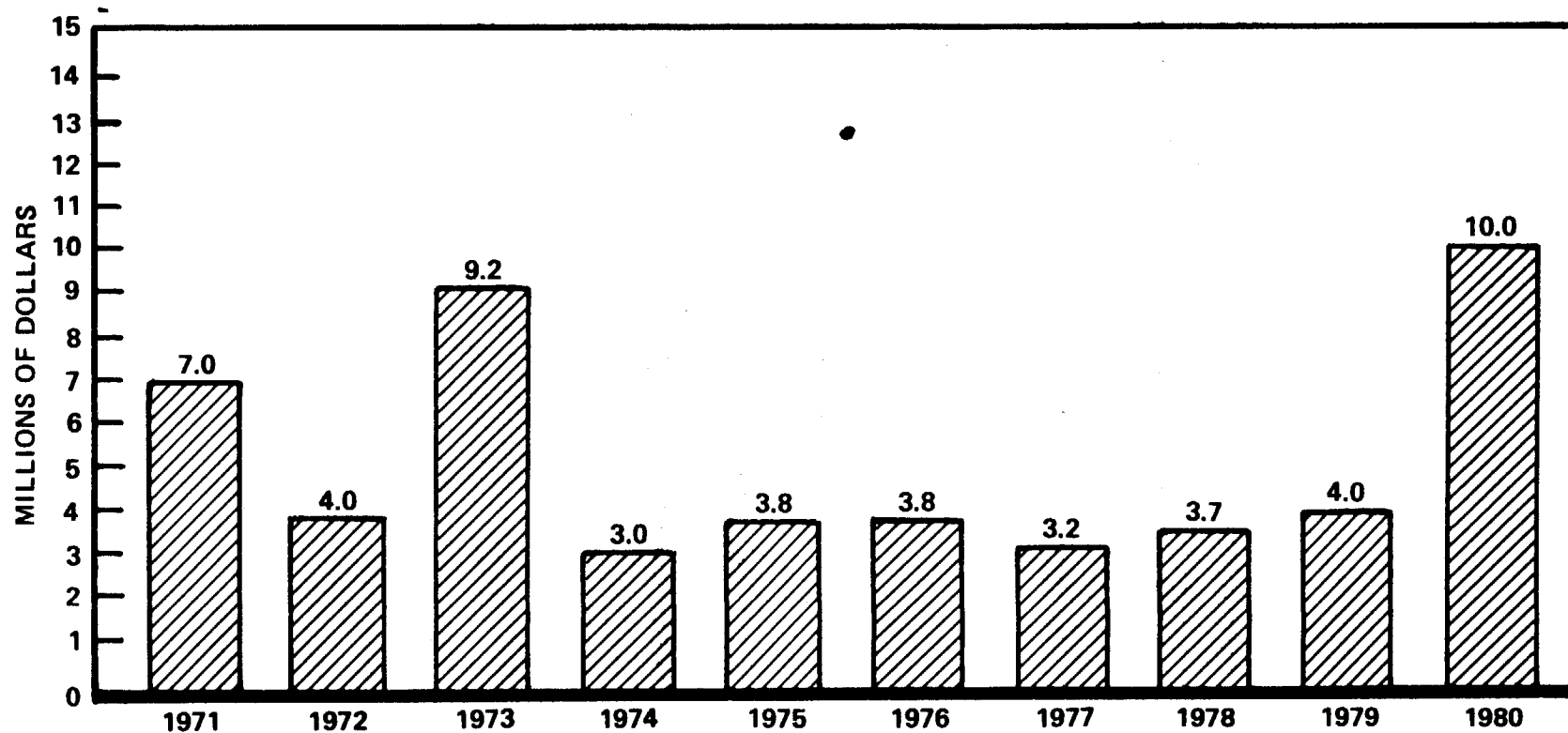


## NASA MATERIAL LOSSES DUE TO MISHAPS \*



\* INCLUDES AIRCRAFT, VEHICLE, AND FIRE MISHAPS  
AND LOSSES OF OTHER PROPERTY.  
DOES NOT INCLUDE CONTRACTOR LOSSES.  
DOES NOT INCLUDE MISSION FAILURES.  
DOES NOT INCLUDE TEST OPERATIONS LOSSES.

## TOTAL COSTS TO NASA DUE TO MISHAPS\*



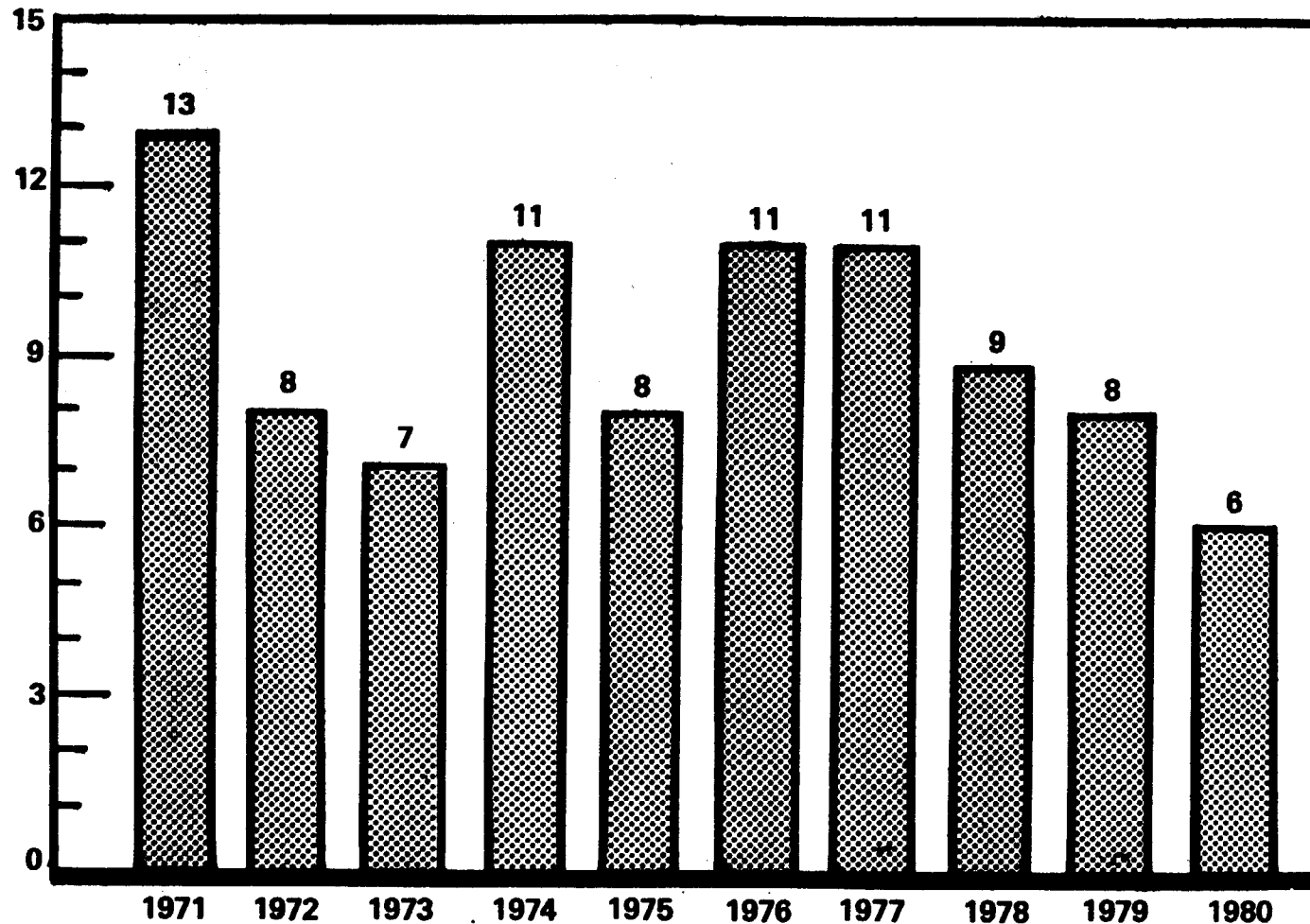
\* DOES NOT INCLUDE CONTRACTOR LOSSES.

\* DOES NOT INCLUDE MISSION FAILURES.

\* DOES NOT INCLUDE TEST OPERATIONS LOSSES.

# NASA EMPLOYEE-YEARS LOST DUE TO ON-THE-JOB INJURIES \*

EMPLOYEE YEARS



\* 260 WORK DAYS - 1 EMPLOYEE-YEAR

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FIGURE 16

# ACCIDENT CAUSE ANALYSIS REPORT

NASA

Report No./Year (Calendar)

1980

INSTALLATION	MONTHLY TOTALS			QUARTER TOTAL	TOTAL TO DATE
<b>SECTION I: SHIFT</b>					
a.					42/208
b.					3/6
c.					1/4
<b>SECTION II: PART OF BODY INJURED</b>					
a. Head					6/46
b. Eye					6/76
c. Face					3/23
d. Arm					12/63
e. Hand					3/69
f. Finger					9/130
g. Torso					12/39
h. Back					37/101
i. Chest					1/11
j. Abdomen					4/13
k. Leg					14/94
l. Foot					19/57
m. Toe					4/18
n. Other					8/28
<b>SECTION III: AGENCY INVOLVED</b>					
a. Animals					0/18
b. Boilers and Pressure Vessels					1/2
c. Chemicals					2/18
d. Conveyors					0/0
e. Dusts					3/21
f. Electrical Apparatus					2/10
g. Elevators					2/7
h. Hand Tools					9/59
i. Highly Flammable and Hot Substances					0/6
j. Hoisting Apparatus					1/5
k. Machines					3/37
l. Material Handling					32/123
m. Mechanical Power Transmission Apparatus					0/6
n. Prime Movers and Pumps					1/2
o. Radiation and Radiating Substances					1/2
p. Vehicles					8/33
q. Walking Surfaces					41/168
r. Agencies not elsewhere classified					22/224
<b>SECTION IV: TYPE OF ACCIDENT</b>					
a. Striking Against					10/129
b. Struck By					19/138
c. Caught in, on, or between					8/43
d. Fall on same level					18/77
e. Fall to different level					9/35
f. Slip (not fall) or over-exertion					35/117
g. Exposure to temperature extremes					1/10
h. Contact with electric current					0/0
i. Inhalation, absorption, swallowing					2/8
j. Electric welding flash					1/5
k. Foreign body in eye					4/50
l. Type of accident not elsewhere classified					21/114

INSTALLATION	MONTHLY TOTALS			QUARTER TOTAL	TOTAL TO DATE
<b>SECTION V: UNSAFE MECHANICAL CONDITION</b>					
a. Improper Guarding					1/19
b. Defective Substances or Equipment					11/46
c. Hazardous Arrangement					15/45
d. Improper Illumination					2/6
e. Improper Ventilation					1/2
f. Unsafe Clothing					9/62
g. No unsafe condition					70/452
h. Unsafe condition not elsewhere classified					17/71
i. Other					4/26
<b>SECTION VI: UNSAFE ACT</b>					
a. Operating without authority					0/0
b. Operating or working at unsafe speed					5/24
c. Making safety devices inoperative					1/2
d. Using unsafe equip/hands instead of equip/equip unsafely					8/41
e. Unsafe loading, placing, mixing, etc.					11/30
f. Taking unsafe position or posture					40/132
g. Working or moving on dangerous equipment					1/3
h. Distraction, teasing, abusing, startling, etc.					7/48
i. Failure to use safe attire or pers. protective devices					3/34
j. No unsafe act					40/350
k. Unsafe act not elsewhere classified					13/70
<b>SECTION VII: TYPE OF INJURY</b>					
a. Abrasion					1/35
b. Avulsion					1/6
c. Burn, Chemical/Cryogenic					0/7
d. Burn, Thermal					1/18
e. Contusion					28/168
f. Dermatitis					1/5
g. Foreign Body					6/58
h. Fracture					19/27
i. Laceration					4/98
j. Puncture					0/19
k. Sprain or Strain					60/224
l. Toxicological					5/27
m. Other					3/56
<b>SECTION VIII: NO. LOST TIME INJURIES</b>					
Total					131/426
<b>SECTION IX: REMARKS</b>					
<p style="text-align: right;">Legend</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"> 25  3 /  25 </div> <div> Denotes injury cases only.  Top number denotes lost-time injury cases.  Bottom number denotes injury cases. </div> </div>					
<b>PREPARED BY:</b>  T. Kerr			<b>SUBMITTED BY:</b>  		

# ACCIDENT CAUSE ANALYSIS REPORT

CONTRACTORS

Report No./Year (Calendar)

1980

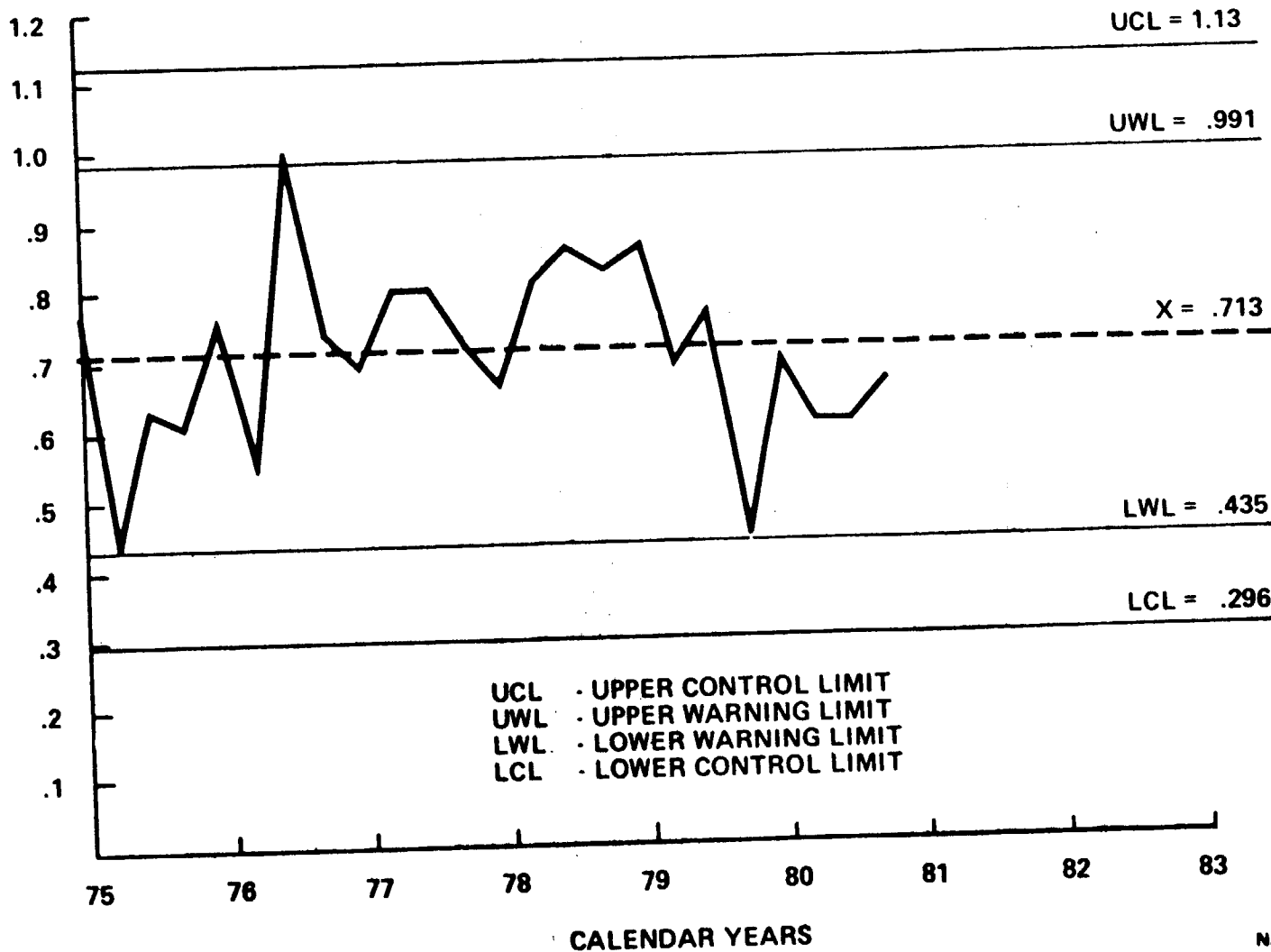
INSTALLATION	MONTHLY TOTALS			QUARTER TOTAL	TOTAL TO DATE
<b>SECTION I: SHIFT</b>					
a.					
b.					
c.					
<b>SECTION II: PART OF BODY INJURED</b>					
a. Head					11/75
b. Eye					4/324
c. Face					1/23
d. Arm					9/201
e. Hand					10/228
f. Finger					12/475
g. Torso					11/84
h. Back					53/203
i. Chest					23
j. Abdomen					6/18
k. Leg					17/205
l. Foot					13/113
m. Toe					5/32
n. Other					10/61
<b>SECTION III: AGENCY INVOLVED</b>					
a. Animals					40
b. Boilers and Pressure Vessels					1/8
c. Chemicals					7/133
d. Conveyors					1
e. Dusts					3/171
f. Electrical Apparatus					3/34
g. Elevators					2
h. Hand Tools					18/379
i. Highly Flammable and Hot Substances					1/12
j. Hoisting Apparatus					7/23
k. Machines					8/145
l. Material Handling					40/371
m. Mechanical Power Transmission Apparatus					10
n. Prime Movers and Pumps					1/3
o. Radiation and Radiating Substances					2
p. Vehicles					9/48
q. Walking Surfaces					46/285
r. Agencies not elsewhere classified					23/422
<b>SECTION IV: TYPE OF ACCIDENT</b>					
a. Striking Against					16/576
b. Struck By					18/330
c. Caught in, on, or between					11/156
d. Fall on same level					19/109
e. Fall to different level					11/44
f. Slip (not fall) or over-exertion					49/235
g. Exposure to temperature extremes					1/17
h. Contact with electric current					2
i. Inhalation, absorption, swallowing					2/98
j. Electric welding flash					10
k. Foreign body in eye					8/248
l. Type of accident not elsewhere classified					33/265

INSTALLATION	MONTHLY TOTALS			QUARTER TOTAL	TOTAL TO DATE
<b>SECTION V: UNSAFE MECHANICAL CONDITION</b>					
a. Improper Guarding					19/162
b. Defective Substances or Equipment					3/51
c. Hazardous Arrangement					17/90
d. Improper Illumination					13
e. Improper Ventilation					2/15
f. Unsafe Clothing					1/13
g. No unsafe condition					95/1422
h. Unsafe condition not elsewhere classified					27/1385
<b>SECTION VI: UNSAFE ACT</b>					
a. Operating without authority					1/5
b. Operating or working at unsafe speed					3/17
c. Making safety devices inoperative					2
d. Using unsafe equip/hands instead of equip/equip unsafely					8/116
e. Unsafe loading, placing, mixing, etc.					10/75
f. Taking unsafe position or posture					24/222
g. Working or moving on dangerous equipment					2/14
h. Distraction, teasing, abusing, startling, etc.					11/51
i. Failure to use safe attire or pers. protective devices					20/260
j. No unsafe act					55/966
k. Unsafe act not elsewhere classified					31/384
<b>SECTION VII: TYPE OF INJURY</b>					
a. Abrasion					1/354
b. Avulsion					2/35
c. Burn, Chemical/Cryogenic					55
d. Burn, Thermal					1/50
e. Contusion					30/426
f. Dermatitis					28
g. Foreign Body					13/303
h. Fracture					11/25
i. Laceration					25/518
j. Puncture					1/111
k. Sprain or Strain					89/391
l. Toxicological					6/81
m. Other					6
<b>SECTION VIII: NO. LOST TIME INJURIES</b>					
Total					200/1600
<b>SECTION IX: REMARKS</b>					
<p>Legend</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 2px; margin-right: 10px;"> 25  5 /  25 </div> <div> Denotes injury cases only.  Top number denotes lost-time injury cases.  Bottom number denotes injury cases. </div> </div>					
PREPARED BY:			SUBMITTED BY		
T. Kerr					

# LOST TIME INJURY RATE CONTROL CHART

## (By Quarter)

NUMBER OF INJURY/  
ILLNESS CASES PER  
200K  
MANHOURS





# TYPE "A" ACCIDENTS - 1980

<u>LOCATION</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>CAUSE</u>	<u>COST</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
GSFC	02-01-80	<ul style="list-style-type: none"><li>-Boiler # 2, Power plant building 24, while firing furnace, an explosion occurred.</li><li>-Boiler failed to light during five attempts--on sixth attempt an explosion occurred.</li></ul>	<ul style="list-style-type: none"><li>-Adequate time had apparently not been taken for complete venting of firebox before attempting to light.</li><li>-Modifications to the air supply and stack system provided insufficient air to accomplish adequate purging during time between attempts.</li><li>-Controls and procedures were inadequate.</li></ul>	\$200,000	<ul style="list-style-type: none"><li>-Conduct thorough engineering reviews after modifications to be sure total effects are understood. Written procedures should be used.</li><li>-Assure procedures are understood and uniformly followed.</li></ul>
MAF	04/13/80	<ul style="list-style-type: none"><li>-During severe rainstorm in area, a section of building 220 roof collapsed.</li></ul>	<ul style="list-style-type: none"><li>-Drainage system inadequate for rainfall.</li><li>-Roof structure deflected, became further loaded, and collapsed.</li></ul>	\$250,000 to 500,000	<ul style="list-style-type: none"><li>-Stiffen I-beam support structure.</li><li>-Install more roof drains.</li><li>-Enlarge existing drain scuppers.</li></ul>
JSC	04-18-80	<ul style="list-style-type: none"><li>-Flash fire during test of Extravehicular Mobility Unit (EMU) in building 7.</li><li>-One contractor employee badly burned.</li></ul>	<ul style="list-style-type: none"><li>-Not known--tests were not conclusive.</li></ul>	\$1.325 million	<ul style="list-style-type: none"><li>-Wear different clothing than nylon in environments where fire could occur.</li><li>-Require safety glasses in these environments.</li></ul>

MSFC

11-07-80

-Underground leak of GH<sub>2</sub>  
4400 psi supply line.  
GH<sub>2</sub> collected in two  
buildings at test stand  
500 complex.  
-Explosion destroyed the  
buildings and damaged  
test stand.

-Isolation valve failed in  
open mode.  
-Supply line failed as a  
result of damage and galvanic  
action over long period.  
-The GH<sub>2</sub> penetrated the  
surrounding underground area  
and entered the building  
through all available holes.  
-An ignition source was avail-  
able when explosive concentra-  
tion occurred.

\$5.9  
million

-Install and monitor GH<sub>2</sub>  
sensors.  
-Do not use buried supply  
lines for hazardous gases.  
-Proof test and leak test  
existing lines on regular  
schedule.  
-For new application which  
must be underground, use  
trenches with gratings.  
-Install manual isolation  
valves to isolate test  
stands from supplies.  
-Institute controls for  
repair, test, and inspec-  
tion of valves and supply  
lines.

# TYPE "B" ACCIDENTS - 1980

<u>LOCATION</u>	<u>DATE</u>	<u>DESCRIPTION</u>	<u>CAUSE</u>	<u>COST</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
GSFC	04-30-80	-Fire occurred in trailer -Damage mostly from smoke, since there was a shortage of O <sub>2</sub> in the trailer.	-Apparently water leaked into a plugmold strip and caused low resistance path to ground which caused internal heating and combustion of varnished panels of trailer.	\$30,000	-Consider fire suppression systems for high value trailers and vans. -Respond immediately to combustion monitors, even after previous apparent false alarms. -Evaluate compliance with fire protection and safety guides.
KSC	07-02-80	-Fire destroyed contractor trailer and pickup truck.	-Electrical short between breaker box and wall plug.	\$10,000	-Better checks of electric circuits and loads applied.
MAF	07-22-80	-While machining ET-6 LO <sub>2</sub> Dome, cutting tool driven through dome.	-Operator error by failing to remove tool set gage prior to starting machining operation.	\$27,000	-Provide specific instructions to require verification by supervisor before operating machine. -Redesign tool set gage so it will not damage equipment. -Assess adequacy of instructions and fail-safe design of tools.

## OCCUPATIONAL SAFETY SURVEYS IN 1980

NASA Headquarters Safety surveys were conducted at five field installations during the 1980 calendar year:

Marshall Space Flight Center	January 1980
Dryden Flight Research Center	July 1980
Jet Propulsion Laboratory	July 1980
Goddard Space Flight Center	September 1980
Lewis Research Center	December 1980

NASA HQ conducts safety surveys jointly with Reliability and Quality and Program Assurance personnel at the field installations approximately every two years. The field installations are delegated responsibility for conducting self-surveys on the off year. The field center self-survey teams include third party members to negate the possibility of conducting a partisan review. The results of the field center self-survey program are encouraging, both in their comprehensive planning and productivity. The center self-survey program requires management involvement to appraise their own activities and to resolve their problems.

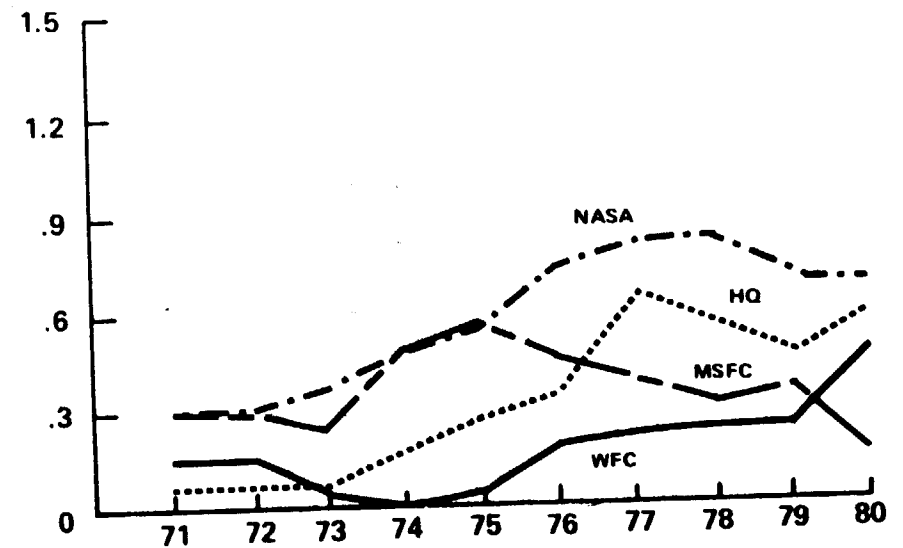
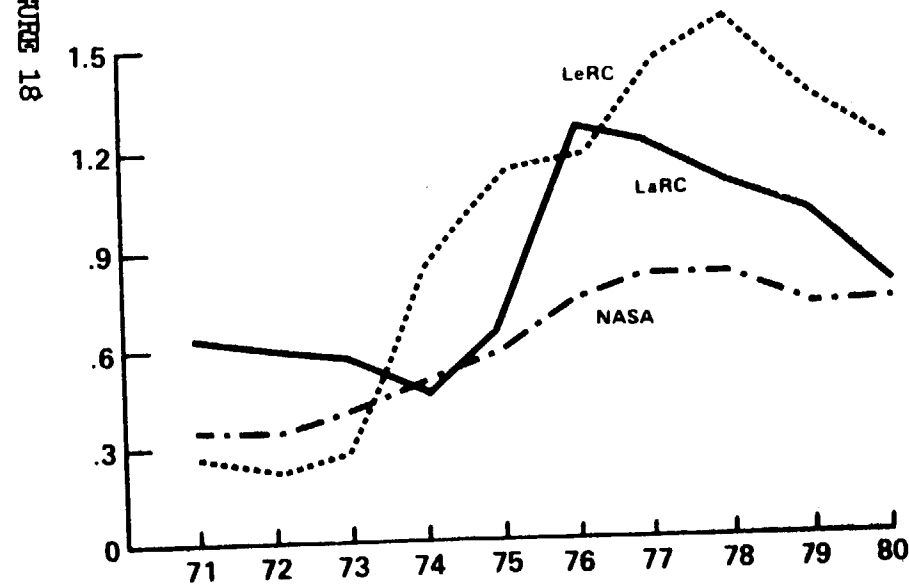
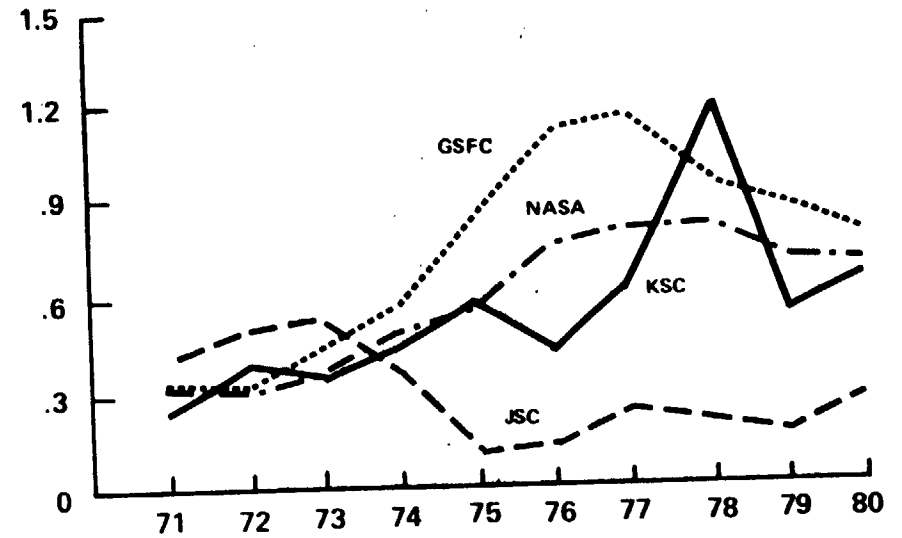
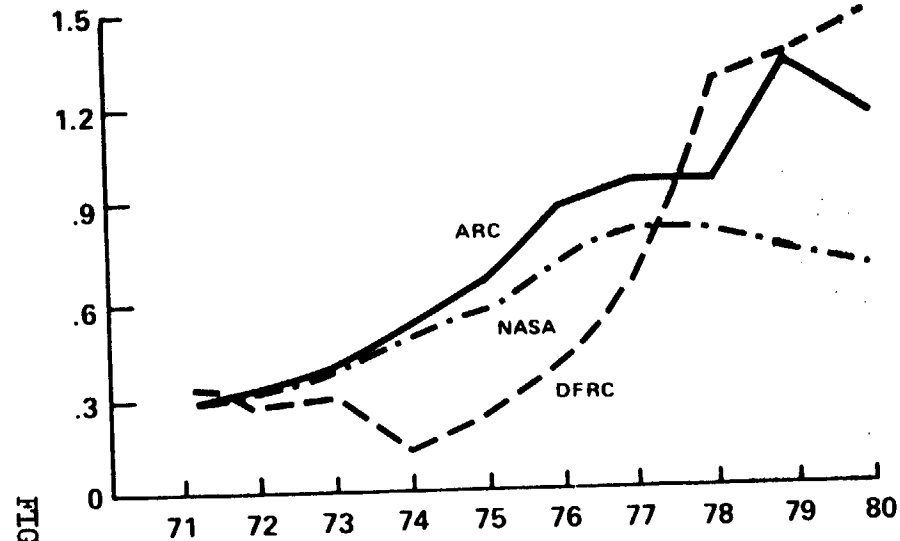
AUTOCORRELATED INJURY FREQUENCY AND  
SEVERITY RATES FOR NASA IN 1980

The correlation procedure used to produce these charts is a smoothing technique which takes some of the randomness out of the data and yet preserves the form or pattern for the period being considered. Depending on the autocorrelation coefficient chosen, the program can retain the fine structure of the data or smooth the curve to show only the trends. A correlation coefficient of 0.5 was used for these curves, the general form is retained, the trend is shown, and the extreme variations are smoothed.

The autocorrelated injury frequency data for all NASA and those centers which had sufficient data for the period 1971 - 1980 are shown in the charts. Five installations had higher rates in 1980 and five and the total were down. MAF and NSTL were zero; therefore, they do not show on these charts.

The severity rates increased in four installations. Three of the increases were quite pronounced and ranged from an increase of 115% to 266%, which is more than three times as much lost time per injury/illness in 1980 as in 1979. The autocorrelation procedures, however, averages these losses over several years and the maximum increase in severity rate indicated is 64% instead of the 266% that actually occurred. There was an agency-wide reduction in severity rate of 20% which, when averaged, looks like 15%.

# INJURY FREQUENCY RATES AUTOCORRELATED

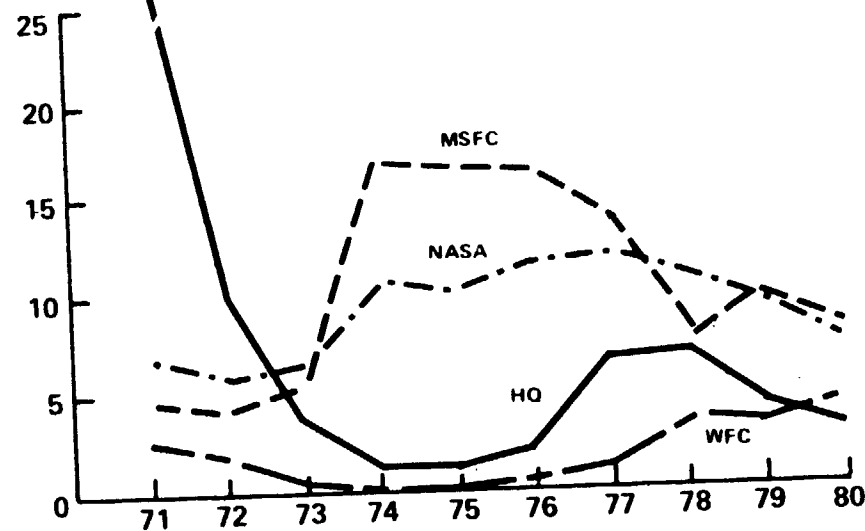
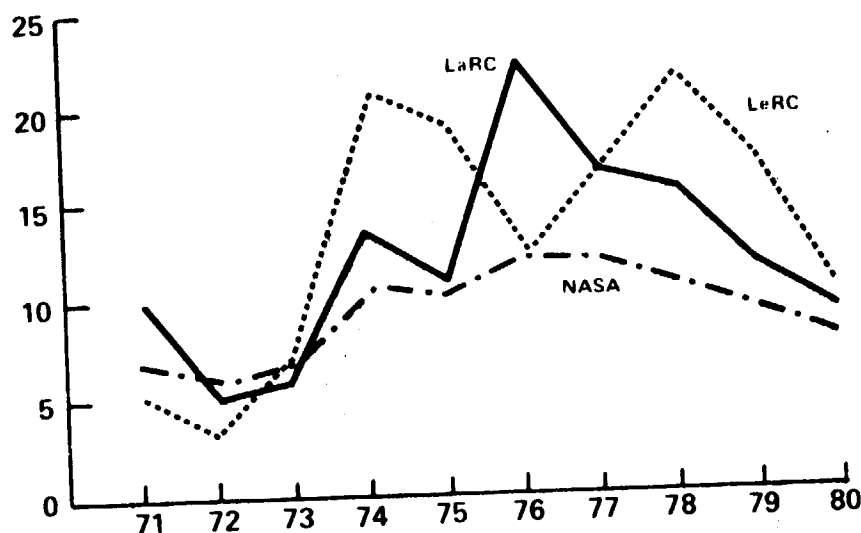
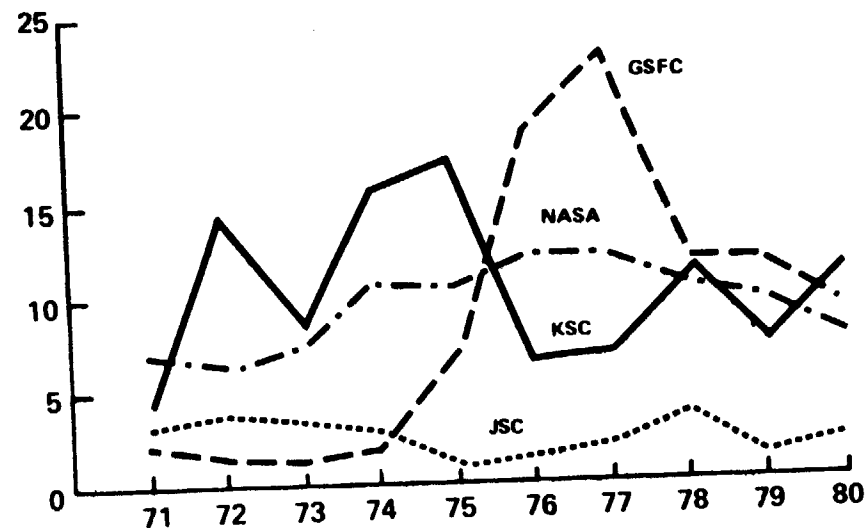
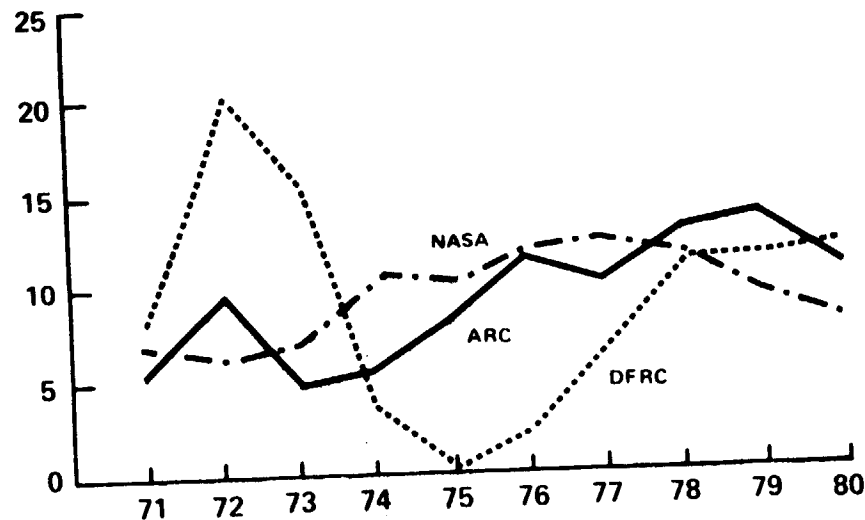


FREQUENCY RATE IS THE NUMBER OF LOST TIME INJURIES PER 200,000 MAN-HOURS WORKED

CORRELATION FACTOR = 0.5

NASA HQ N180-4394 (1)  
Rev. 3-12-81

# INJURY SEVERITY RATES AUTOCORRELATED



SEVERITY RATE IS THE NUMBER OF MAN DAYS LOST BY ACCIDENT PER  
200,000 MAN-HOURS WORKED  
CORRELATION FACTOR = 0.5

NASA HQ N180-4395 (1)  
Rev. 3-12-81

FIGURE 19

NASA AVIATION ACCIDENT/INCIDENT EXPERIENCE

IN 1980

In 1980, the aviation safety record continued to be excellent. A few minor incidents occurred, but we had no major accidents.

There were three incidents which were basically random in nature and location. Total flight time reported in 1980 was 25,199 hours. This is the seventh year our losses have been small, and we must continue our efforts to keep it so.



# NASA AIRCRAFT LOSSES

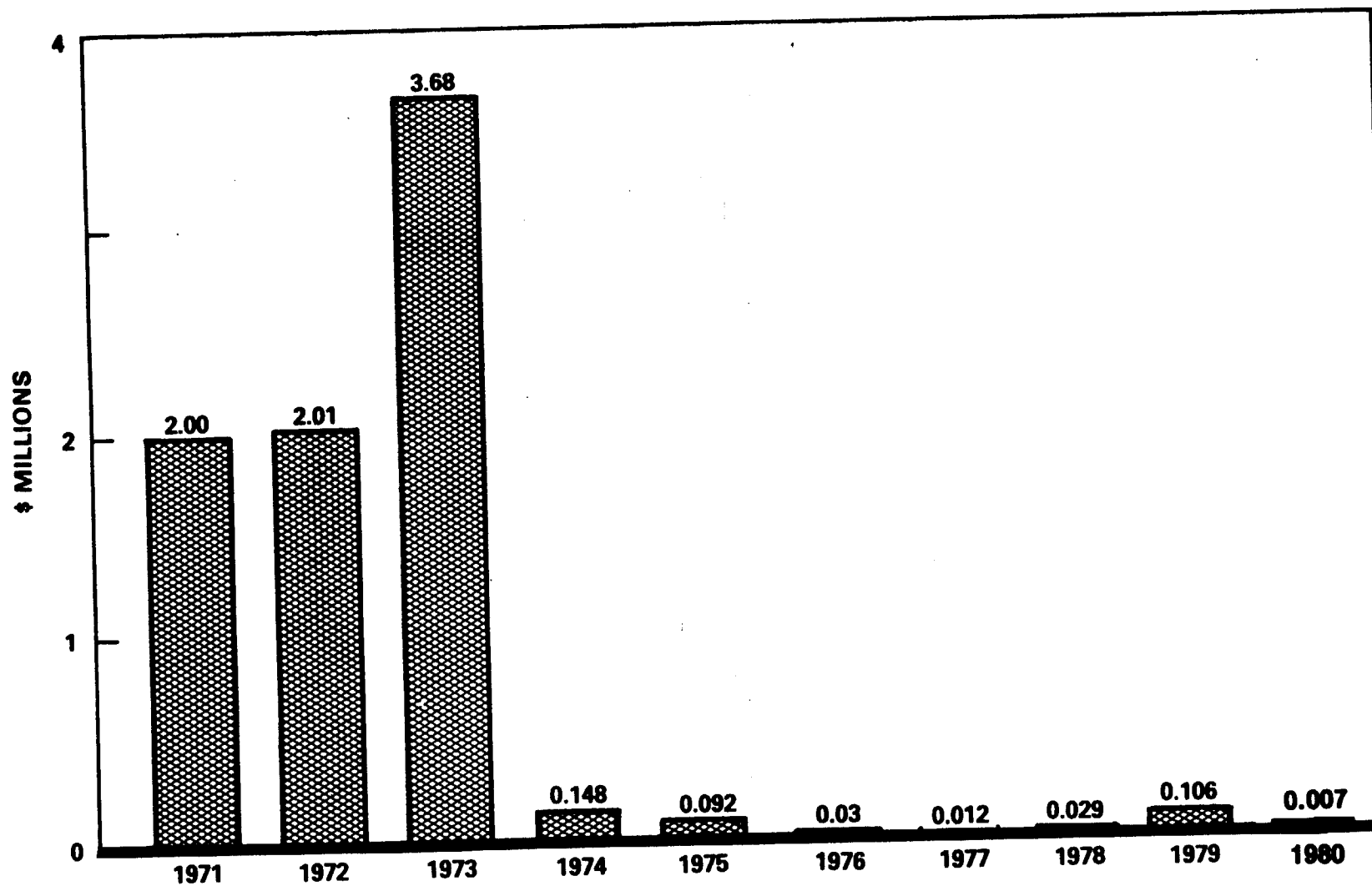


FIGURE 19

### NASA MOTOR VEHICLE ACCIDENTS

There was a decrease in both the automotive accident frequency rate and the costs of accidents for 1980. The goal of 5.0 accidents per million miles driven, which we met in 1973, was achieved and surpassed this year. The rate was 2.68 (a 49% decrease from 1979), and the costs were also down 48% to \$7,400.

Five installations reported zero accidents while driving 1,249,000 miles in government-owned vehicles, and five installations reported zero accidents while driving 2,361,000 miles (official business) in privately owned vehicles. This is 15% and 36% percent respectively of the total miles driven.

There were 11 accidents reported for employee's private vehicles while driving 6.5 million miles for official business. There were 22 accidents to government-owned vehicles while driving them 8.2 million miles. Management is urged to continue to evaluate the driving practices and disciplinary needs to get the attention of those who do not observe traffic laws and good practices.

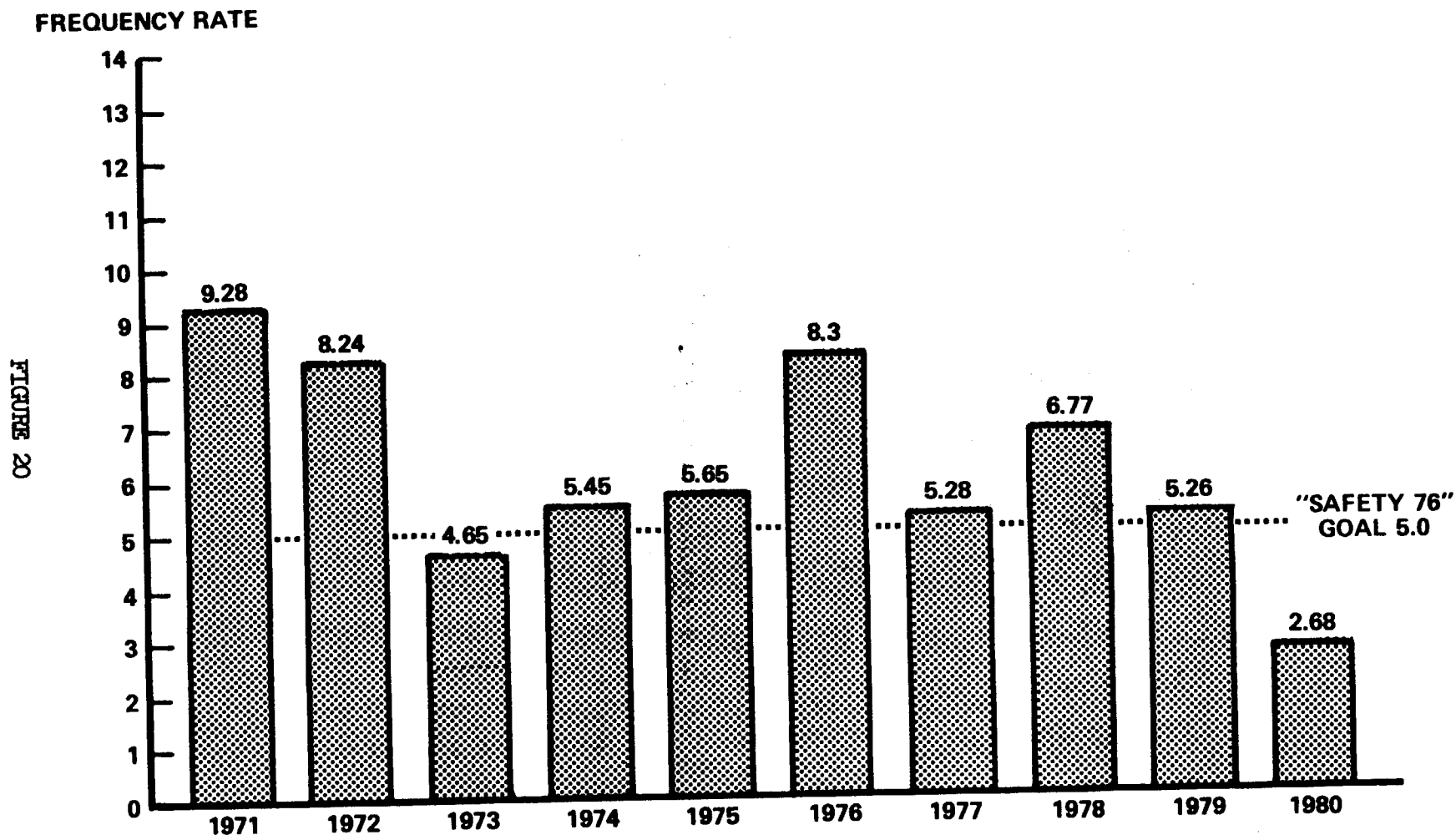
Let's buckle up for safety!

# NASA 1980 MOTOR VEHICLE ACCIDENTS

Field Installations	No. of Accidents		Total Miles Driven (in thousands)		Total Cost (\$)		Frequency Rate* of Accidents	
	Govt.	Private	Govt.	Private	Govt.	Private	Govt.	Private
AMES	0	1	649	373	0	689	0	2.68
DRYDEN	0	0	372	204	0	0	0	0
GODDARD	9	2	2,654	1,288	4,810	650	3.39	1.55
HEADQUARTERS	0	2	95	648	0	0	0	3.09
JOHNSON	0	0	132	1,423	0	0	0	0
KENNEDY	4	1	1,274	392	496	100	3.14	2.55
LANGLEY	2	0	556	710	470	0	3.60	0
LEWIS	3	1	700	520	795	0	4.29	1.92
MARSHALL	2	4	1,189	960	372	0	1.08	4.17
MICHOUD	0	0	1	2	0	0	0	0
NSTL	0	0	0	22	0	0	0	0
WALLOPS	2	0	544	0	463	0	3.68	0
NASA (TOTAL)	22	11	8,166	6,542	7,406	1,439	2.69	1.68

\* FREQUENCY RATE IS THE NUMBER OF ACCIDENTS PER MILLION MILES DRIVEN

# NASA GOVERNMENT MOTOR VEHICLE ACCIDENTS



FREQUENCY RATE IS THE NUMBER OF MOTOR VEHICLE ACCIDENTS  
PER MILLION MILES DRIVEN.

# NASA AUTOMOTIVE LOSSES

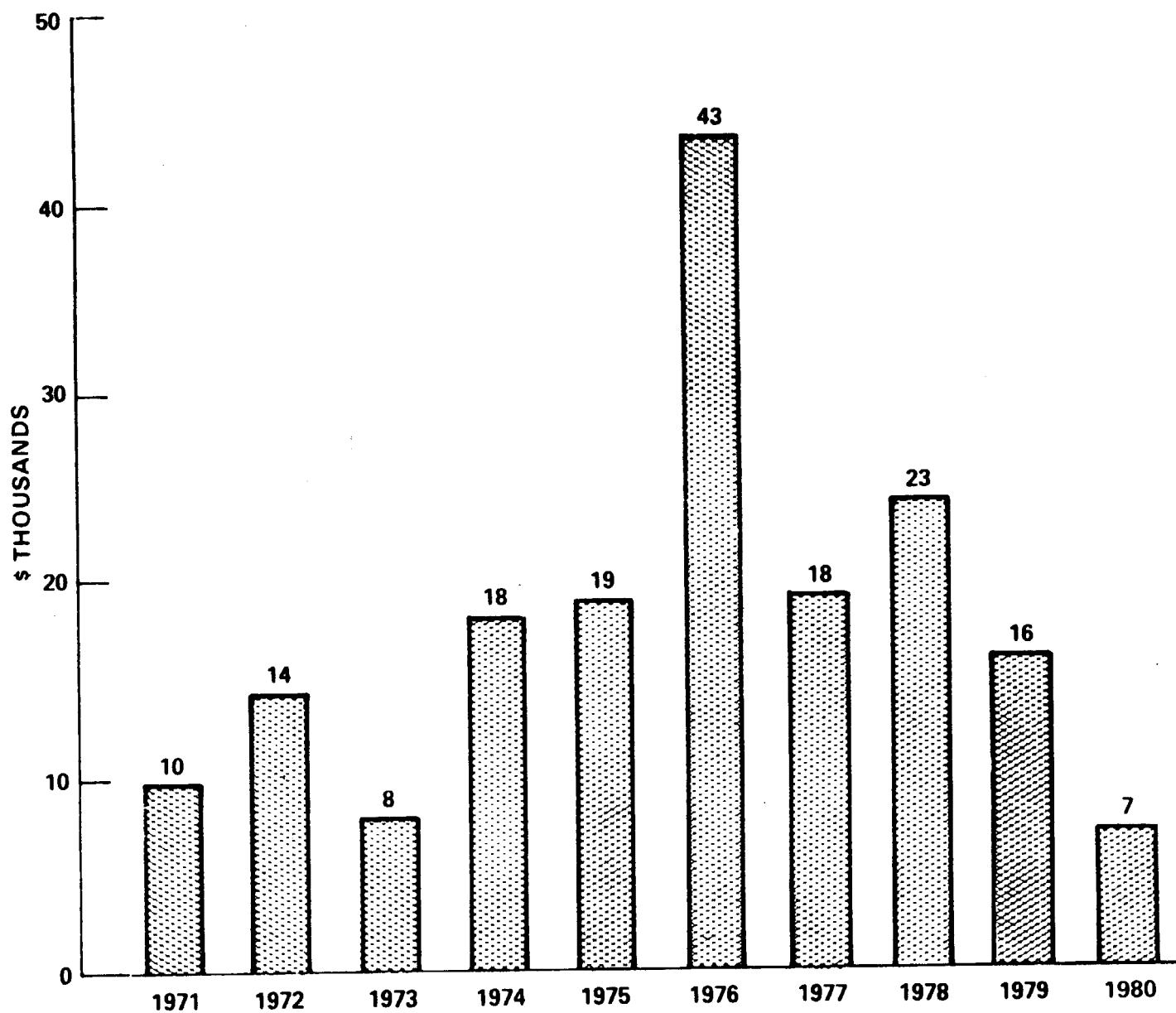


FIGURE 21

## NASA FIRE EXPERIENCE IN 1980

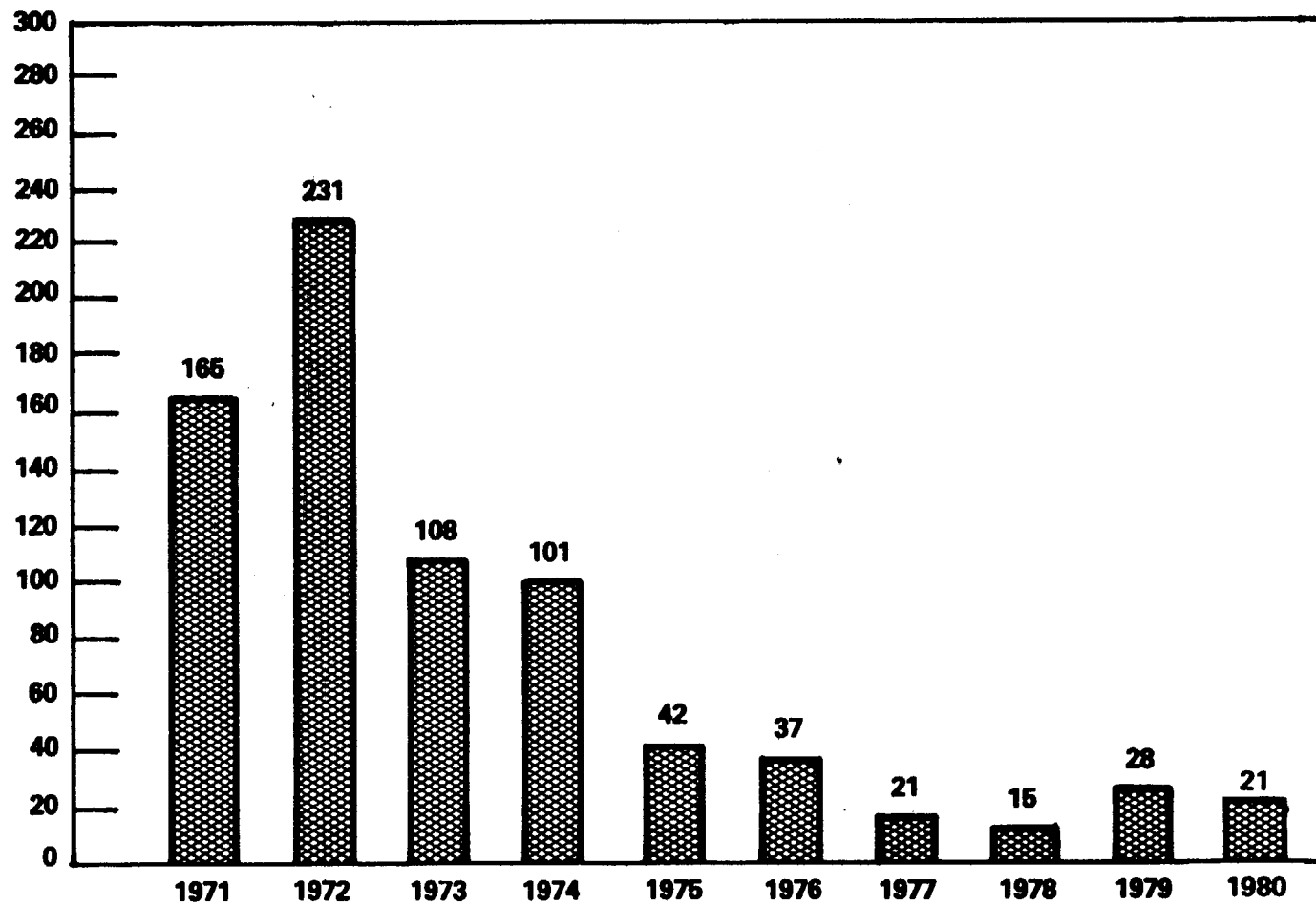
The number of institutional fire mishaps in our facilities and equipment decreased, but their costs for 1980 increased 58% to \$57,000. We continue to have reduced fire losses in buildings and facilities as a direct result of extensive fire prevention activities, excellent fire safety awareness, and a substantial investment in fixed fire detection and suppression systems.

Programs to provide fire detection and suppression systems and to require safe materials and construction must continue. These activities start in the design process and continue through all phases until project completion. Training and education of employees and professional development of fire safety personnel, should continue to be stressed. The use of balanced risk surveys help to identify major areas for improvement. These surveys provide input for our long term planning.

Although special precautions are taken during high-risk test operations, fires related to test failures still dominate our fire losses. These losses are not include in this report.

# NUMBER OF NASA FIRE MISHAPS

NUMBER  
OF FIRES



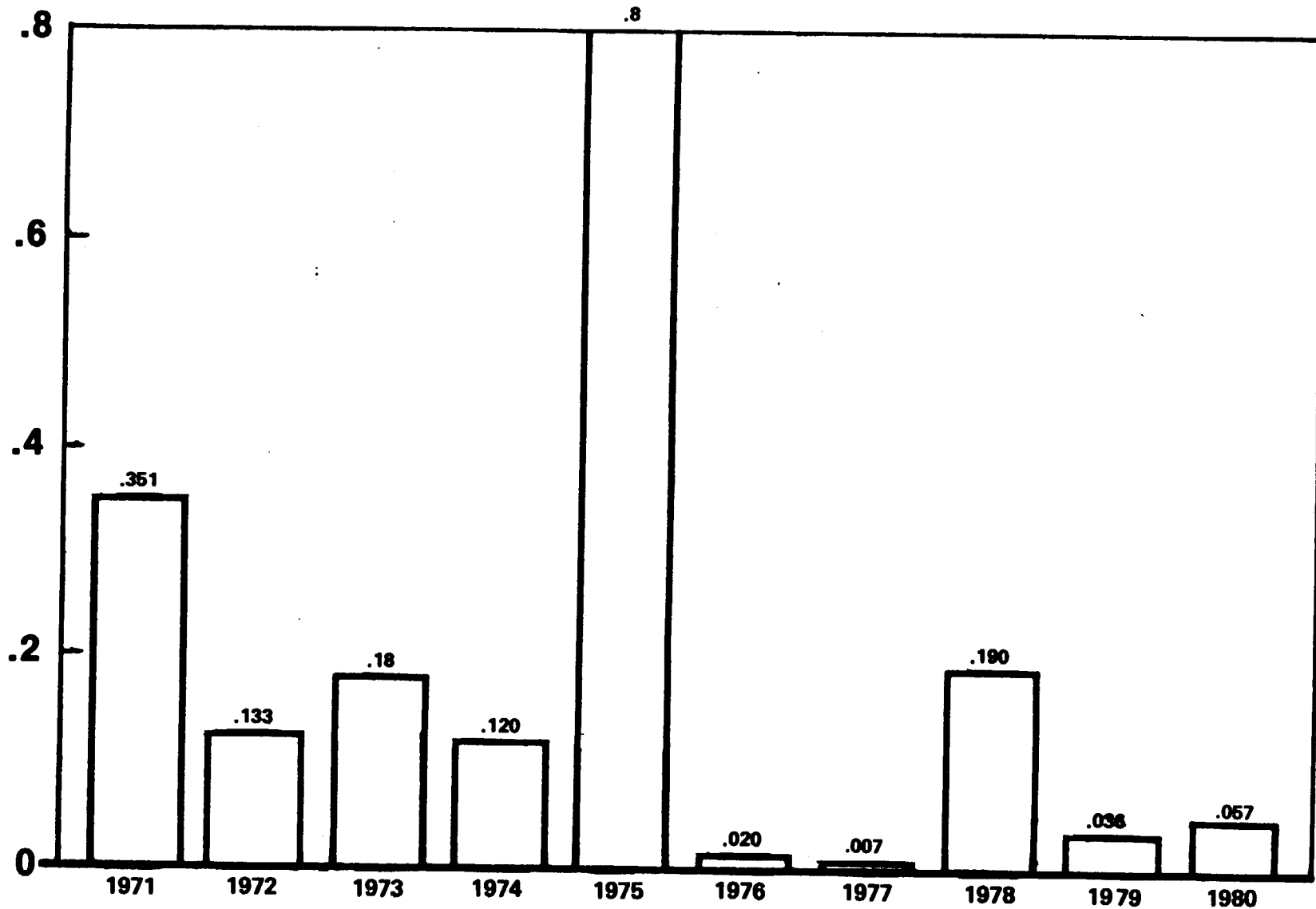
DOES NOT INCLUDE TEST OPERATIONS  
DOES NOT INCLUDE MISSION FAILURES

NASA HQ N180-4381(1)  
REV. 2-27-81

FIGURE 22

# NASA FIRE LOSSES

\$ MILLIONS



DOES NOT INCLUDE MISSION LOSSES OR TEST OPERATIONS LOSSES.

NASA HQ N180-4400 (1)  
REV. 2-27-81

FIGURE 23

40